

Contractors and Engineers Monthly

Vol. 37, No. 9

SEPTEMBER, 1940

\$2 a Year, 20 Cents a Copy

Highlights Of This Issue

• **Pinopolis Lock and Power House**
Continuing our series of articles on the Santee-Cooper power and navigation project in South Carolina, we present in this issue a description of the concreting for Pinopolis lock and power house. See page 2.

• **Unusual Grading Job**
To take the sting out of rock excavation, the contractor for a 2.5-mile highway relocation job in Iowa devised a method of handling both rock and dirt by means of scrapers. See page 2.

• **Hog Island Becomes Airport**
The transformation of Hog Island, World War ship-building center, to a modern airport for Baltimore, Md., and the part played by preformed wire rope on the job are described in this issue. See page 7.

• **Asphalt Spreading Improved**
A special blade developed to avoid double compression and to secure better blending at the center joint on asphaltic surfaces is being used on bituminous paving in Indiana. See page 9.

• **Government Contracts**
Two important announcements affecting contractors have been made recently by Government agencies. One, by the WPA, concerns a new arrangement whereby the sponsor for a WPA project may award a contract for his share of the work. The other, from the Quartermaster General's office, clarifies the cost-plus-a-fixed-fee contract for Army work. See pages 11 and 26.

• **Analyzing Engine Exhaust**
The functions of a gas exhaust analyzer and the reasons for using one in a regular check-up on your truck fleet are discussed in this issue. See page 19.

• **Selecting Proper Lubricants**
Part II of an article, begun in our August issue, describes in some detail the proper lubricants for compressed air equipment, electric motors, gears, and the selection of greases. See page 29.

IN THIS ISSUE

Airport Construction.....	7
Bituminous Paving.....	9
Bridge Raising.....	1
Cartoon.....	4
Concrete Paving.....	1, 42
Contracts for Army Work.....	25
County Road Work.....	1, 14
Editorial.....	4
Engine Maintenance.....	19
Grading.....	2
Legal Decisions.....	18
Lock and Power House.....	2
Lubrication.....	29
Roadside Development.....	23
Traffic Striping.....	40
WPA Contracts.....	11



C. & E. M. Photo
Jackson County's Bay City 30 crane and Klesler 1/2-yard clamshell bucket loading gravel to a Ford truck for highway betterment.

How Jackson County Administers Roads

Large Mileage of Road Mix, The Maintenance of State Highways, and Snow Removal Among Major Activities

(Photo on page 48)

♦ JACKSON County in southern Michigan has an area of approximately 900 square miles, 1,338.7 miles of county roads as of January 1, 1940, and 150.1 miles of state trunk highways. In addition to maintaining the county mileage throughout the year, the County Highway Department has been awarded the contract for a number of years for the maintenance of the state highways within the county, including mowing and

(Continued on page 38)

Important Highway Relocated and Paved As Conn. Boulevard

♦ HIGHWAY engineers throughout the United States are now familiar with the famed Merritt Parkway of Connecticut, and the 160-mile Turnpike in Pennsylvania. No less important to heavy highway traffic is the relocation of U.S. Route 5 which is now partially completed, connecting Hartford, Connecticut, with Springfield, Mass. It will speed traffic by replacing the existing narrow meandering U.S. 5 with dual paved traffic ways 23 feet 11 inches wide separated by a 20-foot center strip, all on a 240-foot right-of-way.

Contract 4 of this project PWA 1309-4-F, 4,054 feet in length, was awarded to Patterson & Rossi, Inc., of Torrington, Conn., on its low bid of \$88,038.41, and the four lanes of concrete paving with curbs at the center strip was sublet to the Lane Construction Corp., of Meriden, Conn. Grading was started March 28, 1940, and the paving was completed on June 18.

Curb Construction

While the paving organization of the Lane Construction Corp. clicked on this job, turning out an average of 1,300 feet of 8-inch uniform slab either 12 feet 7 inches or 11 feet wide, the greatest novelty on the job was the development of a special steel curb form to handle the rounded curb between the pavement and the center strip. This rounded curb is 7 inches wide at the

Lane Construction Corp. Has New Steel Curb Form Which Assures Good Curb Line and Easier and Faster Finishing

base, 4 inches high, has a 3-inch horizontal top and then is rounded to meet the 1-inch vertical face at the inside of the base. The design called for placing 9 1/2-inch long deformed 3/8-inch round dowels in the fresh concrete at 2-foot intervals and 3 1/2 inches from the edge of the pavement to bond the curbs to the pavement. These were driven in at an angle of 60 degrees from horizontal facing traffic and were left protruding 3 inches above the surface of the finished concrete slab.

The curb was placed the day following the pouring of the slab so as to permit the ten men who were required to handle the work to operate on the slab. The special forms developed for this curb were built of steel and were founded on the standard 4-inch rail which is used for building lip curb in mid-western states. This 4-inch form in 10-foot lengths was secured firmly to the top of the Blaw-Knox steel road forms by a slotted key bolt through which a wedge was driven against a washer. Securely attached to this top rail was an angle iron which was cut and bent and then reinforced by welding to give a vertical leg resting against the road form for stability, a horizontal section which spanned the open flat top

(Continued on page 30)

Bridge of the Gods Jacked Up 44 Feet

By HENRY W. YOUNG

(Photo on page 48)

♦ IN order to permit larger ships to navigate the pool above Bonneville Dam on the Columbia River, it was necessary to jack up the Bridge of the Gods, located 4 miles above the dam. The contract for this exacting piece of work was awarded to the Tavares Construction Co. of Los Angeles, Calif., for \$438,543 by the Wauna Toll Bridge Co., owner of the bridge. The work is being done under the direction of the U. S. Engineer Department, builders and operators of Bonneville Dam, and the bridge company is being reimbursed for the work from the Rivers and Harbors fund.

The bridge proper, of the steel cantilever type, is approximately 1,127 feet long; the distance between the two piers is 705 feet; the length of the suspension span, 283 feet; the cantilevers extend

Tavares Constr. Co. Had Exacting Job to Permit Navigation on Columbia River Above Bonneville

211 feet on each side of the two piers; and the approximate weight of the entire structure is 2,000 tons.

As originally built, the bridge was 91 feet above the present pool level, which is at Elev. 72.6. The job was to raise the bridge in order to give it a vertical clearance of 135 feet above pool level, requiring a total lift of 44 feet. The first stage of the work, including the enlargement and strengthening of the bases of the piers, was completed two years ago, on another contract.

Preparation for Lifting

First, the suspension span was removed and dismantled, piece by piece. (Concluded on page 21)



C. & E. M. Photo
The 8-inch Blaw-Knox steel road forms with special curb form used by the Lane Construction Corp. in the reconstruction of U. S. 5 in Connecticut.

Aggregate Handling, Forms and Concrete For Pinopolis Lock

Trestle, Bins and Tunnel Aid Handling of Materials On Central Engg. Co. Job For Power House and Lock

By HOWARD F. PECKWORTH, PWA
Resident Engineer-Inspector, Santee-Cooper Project, South Carolina

(Photo on page 48)

† THE construction plant has been completed and the Central Engineering Co., of Davenport, Iowa, is now in the midst of construction activities on the \$4,172,380 contract which will be Pinopolis Dam, Lock and Power House, a part of the Santee-Cooper power and navigation project in South Carolina. Pinopolis earth dam is being constructed by the Sammons-Robertson Co., of Huntington, West Virginia, under a subcontract and was described on page 2 of our July issue.

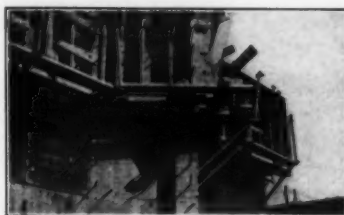
Pinopolis Lock, 180 feet long and 60 feet wide, will have a single lift of 75 feet from sea level to Elev. 75. This will be the highest single-lift lock in the world. The power house, situated next to the lock, is designed for five 40,000-hp and one 13,300-hp turbines to drive five 34,000-kilovolt-ampere and one 11,350-kilovolt-ampere generators. This plant will have a capacity of 450,000,000 kilowatt hours of firm and 250,000,000 kilowatt hours of secondary power during a year of average stream flow.

Foundation Geology

Both lock and power house are located in a cypress swamp on the site of the old Simpson Locks of the original Santee-Cooper Canal. The future 11,350-kilovolt-ampere generator will be on the site of the old turning basin and toll house, just upstream from the former location of Simpson Lock, which if standing would now be partly in the tailrace. This swamp bottom was approximately at Elev. -10, and below the roots and swamp muck were layers of sand and sand-clay down to sea level. Below this is a layer of marl from 10 to 15 feet thick and below the marl is a limestone bed of over 100 feet in thickness.

The marl excavation was relatively soft and could be cut out to line with a pick axe. The limestone excavation, although considerably harder, was easily line-drilled to net excavation lines. The very bottom of the draft tubes at Elev. -52 below sea level was in hard shell limestone with the sump below that at Elev. -60. The shell limestone was grouted upstream from the generators with cement grout, using 20-pounds pressure on the grout machine. Very little water was encountered in the excavation although 3-inch core holes drilled through the limestone into a layer of white sand at Elev. -125 produced artesian water which had to be led off prior to plugging the holes.

The marl excavation was relatively soft and could be cut out to line with a pick axe. The limestone excavation, although considerably harder, was easily line-drilled to net excavation lines. The very bottom of the draft tubes at Elev. -52 below sea level was in hard shell limestone with the sump below that at Elev. -60. The shell limestone was grouted upstream from the generators with cement grout, using 20-pounds pressure on the grout machine. Very little water was encountered in the excavation although 3-inch core holes drilled through the limestone into a layer of white sand at Elev. -125 produced artesian water which had to be led off prior to plugging the holes.



A standard form panel in place, from outside the pour, showing the scaffold brackets and walkway.



A standard panel form in place, from inside the pour, showing the method of bracing.

River Diversion

The visitor to the job invariably asks, "Where is the water to run this power plant?" At present it is not at the site of the power plant and will not be there until Santee Dam is constructed, thus diverting the flow of the Santee River through Pinopolis Lake, power house, and eventually into the Cooper River, past the City of Charleston and out to sea. Thus, the problem of creek diversion at the power house involves not the flow of the Santee but merely the flow of Broughton Hall Creek. Although this creek has a drainage area of 125 square miles, the run-off is such that it is not subject to flash floods, and has a normal flow of 20 to 50 cubic feet per second which will go up to a maximum of about 700 cubic feet per second in flood stage.

A drainage ditch to the west of Pinopolis Lock has taken care of this flow during the early construction period. Subsequent to this, Broughton Hall Creek will be diverted through a 6-foot diameter corrugated pipe which will be placed in a trench between the lock and power house, later to be filled with concrete. The foundation of the west Pinopolis earth dam plus a 20-foot high

dike across the upstream side of the lock and power house will allow sufficient backwater in the broad swamp area upstream (approximately 15,000 acre-feet) to take care of Broughton Hall Creek floods which will not pass out through the 6-foot diameter corrugated pipe.

Aggregate Supply and Preparation

All aggregates and cement are furnished by the contractor, the cement being manufactured by the Penn-Dixie Cement Co. at its Clinchfield, Ga., plant. The cement specifications conform to Standard No. 54, dated June 8, 1938, of the Tennessee Valley Authority for their Class B portland cement. Methods of cement test conform to Federal Specifications SS-C-158. No admixture is being used although superfines in the form

(Continued on page 12)

Scrapers Move Earth And Rock at Dubuque

Contractor Hits Some Rock That is Literally "Heavy As Lead", Also Sandstone In Layers Rooted by Stinger

(Photos on page 48)

† A 2.5-mile relocation of U. S. 20 to provide a more direct route into the city of Dubuque, Iowa, by replacing the winding road that has tormented hundreds of thousands of motorists was completed in the summer of 1939 by Western Contracting Corp. of Sioux City, Iowa, and was paved later by Fred Carlson of Decorah, Iowa. Rock and mud were the high spots when we saw the job because the major portion of the easier earth moving had been completed by the scraper outfit. Just then they were busily engaged gathering pieces of rock into their gaping pans and requiring 2 1/2

minutes to load instead of the usual 50 to 70 seconds required in real dirt moving.

Much to the surprise of the outfit, there were sections where the rock turned out to be genuine lead ore much heavier than the usual grade of rock. The grand part of the work, however, was the removal of the limestone that lay through several of the cuts in 6 to 10-inch bedding planes. To get this in shape for the scrapers to load was a cause for some fast thinking on the part of the Superintendent.

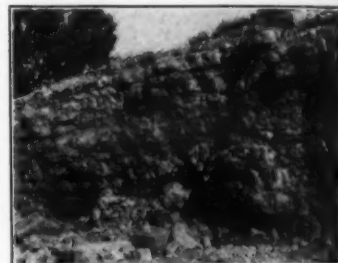
The Stinger

The "Stinger" was the answer to the call for faster moving of the rock. The first rock was rooted out with the center tooth of a Killefer ripper. While this proved better than the use of explosives which was unusually slow and not very effective, the Superintendent figured that there must be a better way to handle the loosening of the slabs of rock so that they would break up into small enough blocks to be loaded by the scrapers. The final answer was the use of the same tooth from the Killefer ripper but in an entirely different manner. Instead of pulling it over the rock, hoping that it would catch in a crack and tear the slab away from the ledge, the tooth was mounted in a rig built by welding 1-inch plates so that the tooth would fit on the front of a LeTourneau Pushdozer in place of the dozer. Then with the push of the tractor behind it and the tooth rooting into the rock and the lift of the cable rigging, the slab answered right away and was ready to be loaded by the scrapers in no time. To protect the tooth from the excessive wear that was inevitable in this work, an extra wear plate was welded on the top of the tooth.

(Concluded on page 34)



Final excavation in the Pinopolis power house area and, under construction, the Clyde Whirley trestle for placing concrete. Above, the power house area, showing the draft tube forms in place.



C. & E. M. Photo
The type of rock that inspired the contractor to use—



C. & E. M. Photo
This "stinger" to rip the laminated rock and then—

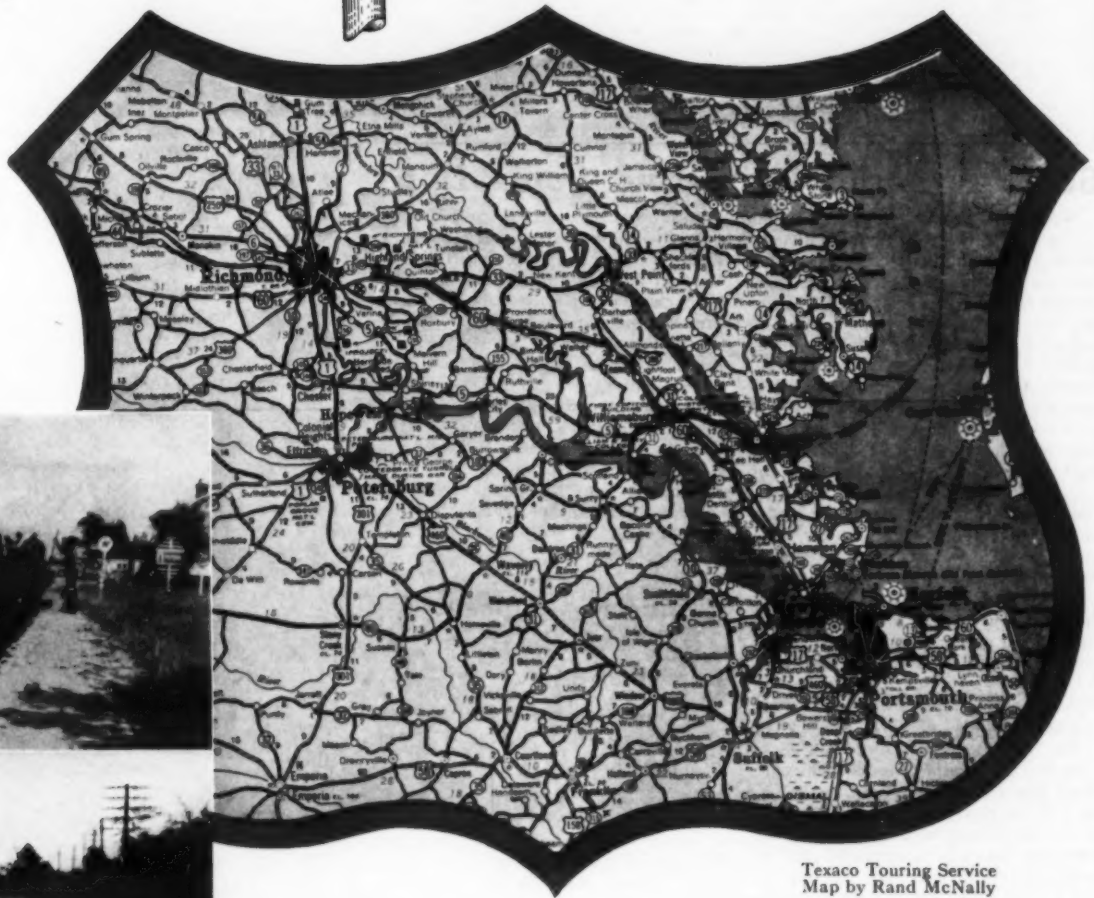


C. & E. M. Photo
The MD7 and LeTourneau bulldozer cleared the way for another sting—



C. & E. M. Photo
While the 12-yard Carryall picked up loose rock and did a little rock digging on its own, thus winning for Western while digging at Dubuque.

64-mile link in is TEXACO-paved



Texaco Touring Service
Map by Rand McNally

Of the 77 miles of U. S. Route 60, connecting Richmond, Va., with the Atlantic seaboard, 64 miles have been paved with TEXACO Asphalt.

This predominant use of TEXACO on one of the State's principal highways clearly reflects Virginia's complete satisfaction with TEXACO Asphalt serviceability and economy.

Plant-mix type construction was used on the entire 64 miles. Approximately 13 miles have been laid during 1940, the rest during the past four years.

TEXACO Asphaltic Concrete, using either broken stone or gravel for aggregate, provides an ideal surface for heavily-traveled highways. Its resilience insures many years' service with little maintenance. Its skidproof texture is a guarantee of maximum safety. It permits the use of locally available aggregate, thereby giving you the largest mileage of hard-surfaced highways your road funds can buy.

To discuss in detail the possibilities of Asphaltic Concrete paving for your own heavy-duty highways, request our nearest office to send an asphalt representative to you.



Method of constructing plant-mix TEXACO Asphaltic Concrete pavement on portion of the 64-mile TEXACO-paved link in U. S. Route 60, Virginia.

TEXACO ASPHALT

THE TEXAS COMPANY, Asphalt Sales Department, 135 East 42nd Street, New York City
Chicago Kansas City Houston Jacksonville Philadelphia Richmond Boston

Contractors and Engineers Monthly

THE NATIONAL BUSINESS PAPER OF THE CONSTRUCTION INDUSTRY

Member of Controlled Circulation Audit

Issued Monthly by Buttenheim-Dix Publishing Corp.
Editorial and Business Office: 470 Fourth Ave., New York City
Printed in Mount Morris, Ill., U. S. A.

THEODORE REED KENDALL, Editor
EDGAR J. BUTTENHEIM, President
GEORGE S. CONOVER, Vice President
DONALD V. BUTTENHEIM, General Manager
O. E. POTTER, Managing Editor
MYRON MACLEOD, Advertising Manager
HERBERT K. SAXE, Treasurer

BRANCH OFFICES

Chicago, Ill., Daily News Bldg., George S. Conover, Vice President; John T. Dix
San Francisco, Calif., Mills Bldg., Duncan A. Scott

Copyright 1940 by Buttenheim-Dix Publishing Corp.

Some Pray for Rain—and Some Don't

We recall a story, told us in our younger days by a New England mother, about the community which was divided over the question of rain. The farmers needed rain badly to bring their crops to fruition, but the fruit growers would be ruined if it rained before their crop was picked for market. As the entire community was very religious and deeply convinced of the power of prayer, those who needed rain asked their leader to meet with them on the east side of Meetinghouse Hill one evening to pray for rain. The others, hearing of this possible calamity, gathered with their leader on the west slope of the hill at the same hour and just as fervently prayed that the Almighty refrain from sending rain.

We never dared ask the outcome, but the opposing interests of farmers in so many of our great agricultural areas who need rain and of contractors laboring in the same areas to complete a certain highway within a stated number of days, or else!, reminded us of the story.

The hardy men who build our highways don't generally pray for abstinence from rain but just sit tight, make the most of the clear dry days, take a guess at the equipment and men needed to complete the job as required, and if necessary take their licking standing up. The paving crews on the Pennsylvania Turnpike had hard going last spring because of the overdose of bad weather, but then the farmer was equally hard hit by the lack of sun to start his crops on their several ways. We saw four successive days lost to the contractors on the fine new super-highway between Elkton and Havre de Grace, Maryland, because of heavy rains. And that wasn't the worst of it, for every time it rains, it takes another two or three days for the grades to dry out so that paving or even grading operations can start again.

**MISSISSIPPI PROTECTS HER
ROADSIDES FROM EROSION
AND IMPROVES THEIR
APPEARANCE AS WELL**
See Page 23.

In fair weather or foul, the contractor is faithful to his task, taking the weather as it comes, and eager to fulfill his contract in accordance with the specifications and their interpretation by the engineer, which incidentally may vary in some places from the interpretation of the same "specs" on the last job. These variations are not intentional, but it would be a good idea if all the state highway departments would instruct their resident engineers in the exact meaning of their various specifications, so that they may be bid upon and carried out more intelligently by those who execute the work.

Let us all pray!

Engineers Comment on Use of Subgrade Felt

To the Editor

CONTRACTORS AND ENGINEERS MONTHLY
I was interested in seeing the advance proof of your article "Use of Subgrade Felt for Concrete Paving."

The Iowa use of tar paper on the subgrade under a concrete pavement was the result of a bit of applied research to which Bert Myers, then Assistant Engineer of Materials and Tests of the Iowa Highway Commission, and other members of the staff contributed as

much as I did.

On making a detailed examination of the cracked pavements in question, it was found that the cracks occurred only in dry weather when the finishing machine was going down hill. Concrete laid uphill or either uphill or downhill immediately after a rain did not crack. The remedy appeared to be either always to go uphill, always to have a rain the night before, or to interpose an impervious layer. The first two possibilities being outside of our capabilities, a laboratory investigation was conducted on miniature slabs and it was found that the cracking could be readily induced by conditions similar to those prevailing in the field or obviated either by saturation of the subgrade or by the use of tar paper.

Both methods were tried on contract work but the latter was found to be more practicable and effective and became standard practice.

Roy W. Crum, Director
Highway Research Board

To the Editor

CONTRACTORS AND ENGINEERS MONTHLY
Proof of the article on the use of a waterproof membrane between earth subgrade and concrete in concrete pavements has been received.

In 1929 California made an experimental installation along this line in the Imperial Valley, using both felt and waterproof paper. This type of treatment, however, has never been adopted further, since we have found that importation of subgrade material and complete watering of the subgrade satisfactorily meets the conditions generally



"I should have smelt a rat when the wife decided to move upstairs!"

encountered in this state.

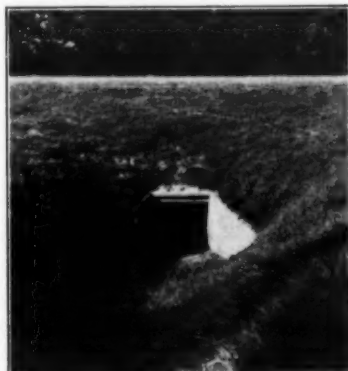
R.M. Gillis, Construction Engineer
California Division of Highways



Mississippi State Highway 6 before a roadside development project.



Two other scenes on State Highway 6 in Lafayette County, Miss., before a contract for flattening slopes, sodding and planting was awarded to Winston & Griffith.



Solid sodding around the inlet end of a reinforced concrete box culvert.



One of the nine rock-masonry walls to protect trees along the roadside.



A typical rock-masonry outlet ditch to check erosion on Miss. Highway 6.



A long vista on Miss. Highway 6 after completion of the Winston & Griffith roadside-development contract for the Mississippi State Highway Department, showing well-rounded slopes of a series of cuts.



A new flattened cut slope fully sodded, giving longer sight distance on the curve and insurance against erosion. Winston & Griffith of Dallas, Texas, contractor for this Mississippi project, won the C. & E. M. National Roadside Development Award in 1939.

Sales of Shovel Dippers Show More Construction

Definite evidence of increased construction activity is shown in the sharp sales increases in power shovel dippers, according to the Pettibone Mulliken Corp., 4710 W. Division St., Chicago, Ill., manufacturer of welded dippers for all makes of power shovels. During the first five months of 1940, this company sold more welded dippers than in the entire year of 1939.

This remarkable gain is due not only to increased activity, according to this company, but also to a growing recognition of the advantages of welded construction for power shovel dippers. Welding decreases dead weight while it increases strength so that the use of a welded dipper permits bigger payloads and easier operation, the company claims. It is stated that use of welded dippers has in some cases actually stepped up production as much as 30 per cent.

Advanced Design Hoists

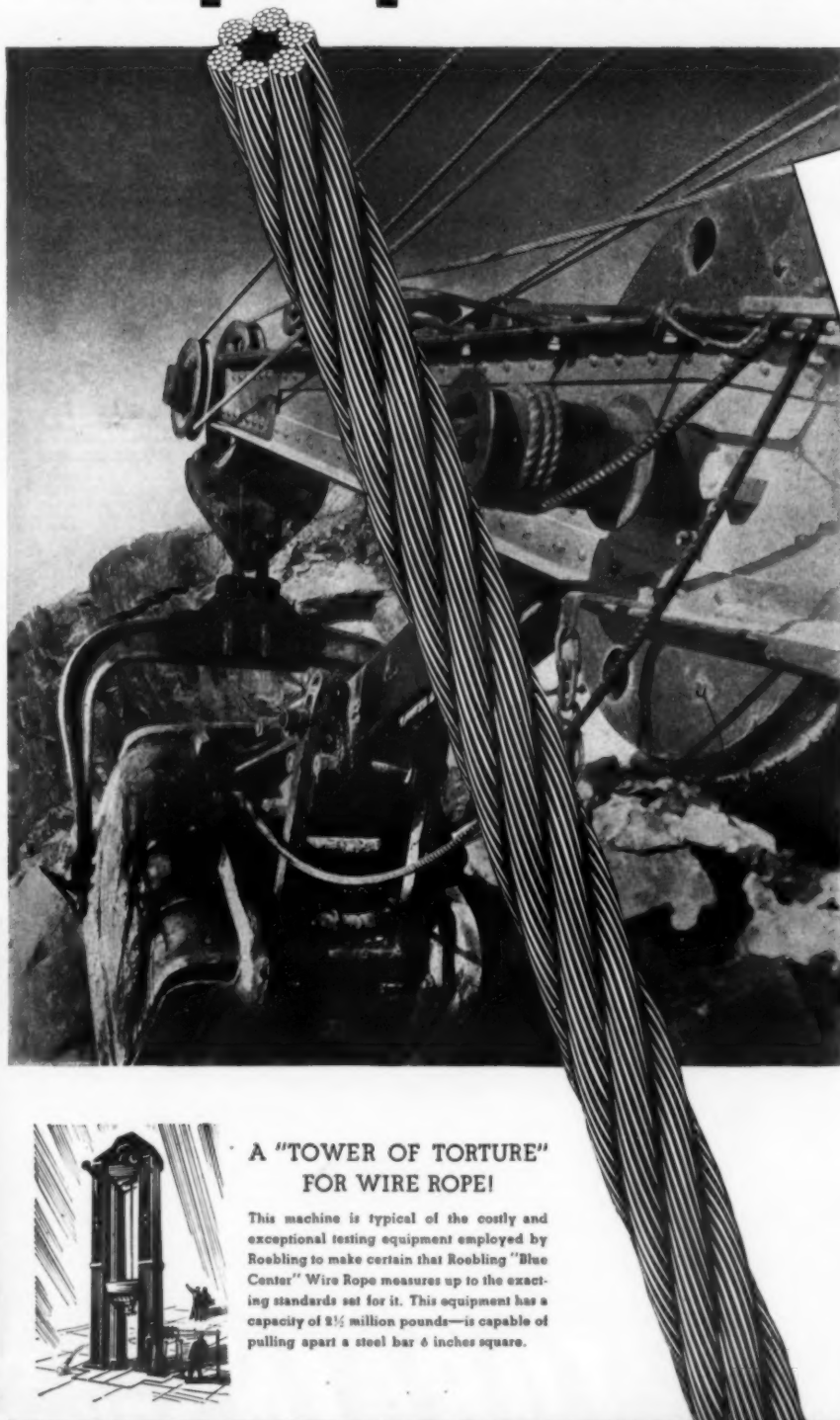
The Coffing Hoist Co., Danville, Ill., has recently issued a catalog covering the complete line of Coffing products which include trolleys, spur gear chain hoists, utility maintenance tools, differential chain hoists, ratchet lever hoists, spur gear gravity hoists, electric hoists, and load binders.

One of the items featured in this catalog is the Coffing Safety-Pull ratchet lever hoist which is equipped with a dual

ratchet and pawl assembly, independent of each other, and the handle is always under control. According to the manufacturer, the Safety-Pull is the lightest ratchet lever hoist on the market, the small model A $\frac{3}{4}$ -ton hoist weighing 14 pounds and the large Model W 15-ton hoist, 150 pounds.

Copies of this catalog, which is illustrated with many photographs of the Coffing products and their many applications to the construction field, may be secured direct from the manufacturer.

Strip Rope Costs to the Bone...



ROEBLING



**"BLUE
CENTER"**

WIRE ROPE

STANDARD OR PREFORMED

Every dollar saved counts on most earth moving and construction jobs. That is why an ever-increasing number of contractors are taking advantage of the cost-cutting ability of Roebling "Blue Center" Wire Rope.

First of all, "Blue Center" is the finest of all Roebling Wire Ropes. It represents the highest achievement of all Roebling's research and manufacturing efforts. It has been developed with the one idea of producing a super-quality rope—one which will assure the maximum of durability, safety and economy in rope service. Made of famous Roebling acid open-hearth steel—it provides the highest degree of resistance against abrasion, fatigue and sudden shocks.

You can easily prove the cost-cutting and safety advantages of Roebling "Blue Center" Wire Rope. Install "Blue Center" when you re-rope your equipment. Keep accurate service records. Compare. Then, you be the judge.

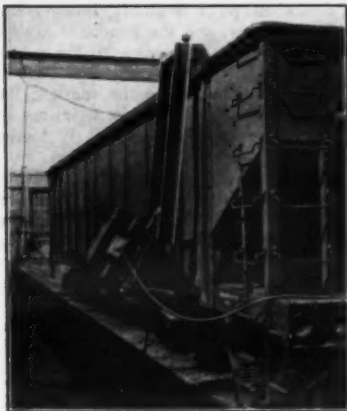


JOHN A. ROEBLING'S SONS CO.
Trenton, N. J. Branches in Principal Cities

A "TOWER OF TORTURE" FOR WIRE ROPE!

This machine is typical of the costly and exceptional testing equipment employed by Roebling to make certain that Roebling "Blue Center" Wire Rope measures up to the exacting standards set for it. This equipment has a capacity of 2½ million pounds—is capable of pulling apart a steel bar 6 inches square.

ROEBLING "BLUE CENTER"... The Finest of all Roebling Wire Ropes



A Syntron Model V-500 vibrator attached to a railroad car to facilitate unloading aggregate and similar materials.

R. R. Car Vibrators Speed Up Unloading

A new large electric vibrator, fitted with hooks for attaching to hopper-bottom railroad cars to speed up the emptying process, was recently announced by the Syntron Co., 227 No. Lexington Ave., Homer City, Pa. These vibrators, which are huge pulsating electro-magnets striking 3,600 times a minute and together with the hook weigh 950 pounds each, are used in pairs, two to a car on opposite end sides. They are also designed for use, without the hook, on big bunkers and storage bins to promote a free flowing discharge of the material.

The vibrators have a separate electrical control panel which contains thermionic valves for changing alternating current to pulsating current, operating switches, and a variable resistance for controlling the vibrators' amplitude or power. They are designed for operation on 220-volt single-phase alternating current.

Further information on this Model V-500 vibrator may be secured by interested contractors and engineers direct from the manufacturer or from this magazine.

New Air Compressor Is Easily Portable

A new two-cylinder two-stage 105-foot portable compressor has been announced recently by the Le Roi Co., Milwaukee, Wis. Known as the 105 GV, this new compressor is designed especially for smaller jobs or where frequent changes in location are necessary. It is light in weight, and is available on the two-wheel pneumatic-tired trailer, or on skids for truck mounting.

The pneumatic-tired unit is spring mounted and has a double-acting spring-cushioned pintle eye which permits towing at high speeds without transmitting any shock to the machine. Like all other Le Roi compressors, the engine and compressor are built in one plant. The heavy-duty valve-in-head Le Roi engine designed especially for this compressor has replaceable wet sleeve cylinders and hardened-steel valve-seat inserts which seldom require grinding, according to the manufacturer. This model is also available in the 85-foot size.

Further information on these new portable air compressors may be found

in Bulletin 22G, copies of which may be secured direct from the manufacturer by mentioning this item.

Activities of Rotoblade Shown in "Picture Book"

Bearing out the company slogan "Rotoblade throws snow from coast to coast," a new pictorial catalog recently issued by the Snow Removal Equipment Co., 400 Seventh St., San Francisco, Calif., shows Rotoblades in action in practically every section of the snow belt, on state and county highways, in national parks, and at airports. From Alaska and Oregon to Providence, R. I., this speed patrol unit which combines the action of a blade and a rotary-type snow plow is shown in use clearing snow from the traveled way.

It is stated that if used in stagger formation, one Rotoblade following another, a 16-foot width of roadway can be cleared at the speed of blade plows. The Rotoblade is also used to follow a blade plow in light snow, the Rotoblade

handling the snow pushed over by the blade plow and also clearing its own 8½-foot width, throwing the snow from both plows 50 feet off the highway. It is general practice to use a Rotoblade during the storm as a patrol unit, and then when the storm is over use it to clear snow completely from other sections of highway.

Copies of this "Picture Book" on the Rotoblade, which also contains a description and specifications of the Model SM-37, may be secured by interested state and county highway engineers direct from the manufacturer by mentioning this item, or from this magazine.

Milburn Elects New Secy.

W. Leslie Lawrence was recently elected Secretary of the Alexander Milburn Co., Baltimore, Md., succeeding Harvey H. Johnson who died on June 2 after 25 years with the company. Mr. Lawrence has filled various positions with this organization and recently became one of the company's directors.

Gyrating Screens For Portable Gravel Plants

The Simplicity Engineering Co., Durand, Mich., has issued a bulletin giving a general description of Simplicity gyrating screens and data on the range of sizes in which they can be supplied as single, double, triple and four-deck units. According to the manufacturer, these screens have a special application for portable gravel plants as they operate with positive effect in screening material with the positive vibration being contained in the screening frame itself, instead of in the supporting structure, an effect which is accomplished by means of Simplicity's patented solid counterbalanced eccentric shaft which allows the machine to operate at maximum efficiency without throwing stresses and strains in the supporting structure.

Copies of this illustrated bulletin, No. 39, can be obtained by writing direct to the manufacturer and mentioning this item.

From COAST To COAST

LORAINS

ARE BUSY BUILDING and SERVING AIRPORTS



Crash Plane Service—Lorain crane handles damaged plane from field at Cleveland Air Races.



Ship Repair—Lorain crane handles motor replacement job at California airport.



Drainage—Two 1/2-yd. Lorain-40A clamshells dig trenches and lay pipe at new Washington, D. C. airport.



Steel Erecting—Lorain-95 crane sets steel for hangars at La Guardia Field, New York City.



Steel Erecting—Motor-Crane unit erects steel for hangar at Moffett Field, California.



Grading—1 1/2-yd. Lorain-79 handles 2,500,000 yds. of excavation for Sashomish County, Wash. airport.

Complete information on Lorains, including down-to-earth performance data, is available on request.

THE THEW SHOVEL CO.
LORAIN, OHIO

LORAINS ^{3/8 TO} _{2 1/2 YD.}

TARPAULINS ROAD MATS WINDBREAKS

CONTRACTORS' SUPPLY DEALERS in every state sell the Fulton line. Specify SHIELD-BAY and FULTON Tents, Tarps, and Windbreaks—anything made of canvas. Also Fulton Road Mats and Girders. Fulton products are good and their prices are right.

If your dealer can't supply you, write our nearest plant for catalog, samples and price list.

Fulton Bag & Cotton Mills

Manufactured by Fulton Bag & Cotton Mills, Inc., 1000 Broadway, New York, N.Y.

write
for
prices

Hog Island Becomes New 494-Acre Airport

World War Ship-Building Center Receives Fill from Delaware River; Airport For Philadelphia Created

By C. C. HERMANN

✦ HOG Island, noted during the World War as an important ship-building center, has been converted into one of the nation's largest airports by the Department of Public Works of Philadelphia, Pa. Exhaustive surveys of the area were made by the City of Philadelphia and it was found to possess features making it exceptionally desirable as an air terminal. It is at the junction of the Schuylkill and Delaware Rivers, making it easy to locate from the air; it is adjacent to a large metropolitan area on both sides of the Delaware not previously served by such facilities; and the immediate area is one comparatively free of dense fogs and other poor atmospheric conditions prevalent along the Atlantic coast.

The airport project was started in 1928 by a privately conducted survey to determine a suitable site. In 1930 the City of Philadelphia purchased from the U. S. Shipping Board the Hog Island property. Permission was granted to the U. S. Engineer Department to use the Hog Island tract as a place of deposit for hydraulic fill from dredging operations in the Delaware River to an amount sufficient to raise the average height of the entire property 10 feet. The undertaking involved nearly 3,000,000 yards of fill.

Description of Airport

The 494-acre air field has four runways, each over a mile long. The south line of the airport parallels the shore of the Delaware River at Hog Island. Runways 2, 3 and 4 on the map on page 17 are 150 feet wide and the instrument-control runway No. 1 is 200 feet in width. The radio beam for this runway is located in Delaware County, in line with the runway, the normal approach of a landing plane being from the west.

All runways are hard-surfaced with bituminous concrete, with white-cement gutters along each edge of each runway. These gutters drain into storm-water drains paralleling each runway. Since the gutters are of white cement, they are easily visible from above during the day and at night the edges are illuminated by lights of a color scheme designed to indicate the distance of the lights from the end of the runway. The field edge is marked by regulation lights and by a Chain Link wire fence over 5 miles in total length.

Buildings at the airport include the administration building, a restaurant and a service building. In the administration building, which is 55 feet wide x 170 feet long, are located the various ticket offices, a post office, the waiting room, the administration offices, an express office, and the office of the Civil Aeronautics Authority. Directly in front

of the administration building is the 55-foot beacon tower. Passengers must pass out through the center of the main building to a paved area 150 feet wide x 580 feet long, on which only passengers are allowed, spectators being held back by a Chain Link fence. The planes are brought up on the loading area and stop in front of one of eight gates leading from the passenger area.

The barrier between the administration building and the field is constructed of an 8-inch thick x 18-inch high reinforced concrete base on top of which is placed a 30-inch high fence. The gateways are of wrought iron, in keeping with the other construction.

Large Amount of Fill

A few years ago, the entire area of

this level well-drained well-equipped airport was approximately 10 feet lower than it is today, but not uniformly that much lower, so that there were many spots requiring additional fill.

Much of the fill, about 2,500,000 cubic yards, was obtained from the channel of the Delaware River. This material was dredged from the river bottom, pumped through long pipe lines and deposited back of check dams. After a large quantity of fill had been so deposited, it had to be spread out over a vast area to fill in the low spots, involving the handling of practically every yard of fill a second time. Trucks were used to move the material, which was loaded by crawler cranes with clamshell buckets.

Other very useful equipment was the fleet of the International 35-hp TracTracTors with Gar Wood bulldozers which were used to aid the cranes by keeping the bottom level and avoid useless and expensive digging. By setting the 6-foot blade at the proper angle, the material was moved toward the shovel.



A TracTracTor and bulldozer bringing a part of the Philadelphia airport to its final level.

They also kept in condition the temporary roadways used by the fleet of thirty-five 2½-yard Mack trucks, which moved the fill to the distant parts of the field.

(Concluded on page 17)

Bridgman

MORE HORSEPOWER PER DOLLAR

Greater Operating Range • More Flexible Power • Better Performance

Power that fully satisfies every performance demand — thrifty with gasoline under all conditions—Briggs & Stratton Air-Cooled Gasoline Motors deliver more horsepower per dollar—more motor value — in each power range.

STANDARD EQUIPMENT ON

- Lawn Mowers • Tractors, Cultivators • Washing Machines, Milk Coolers • Sprayers, Dusters, Sorters, Conveyors • Grinders, Mixers, Pulverizers, Graders • Pumps, Water Systems, Compressors • Milking Machines, Separators, Chargers • Contractor and Railroad Equipment • Family Boats, Tenders, Scooters and hundreds of other applications.

4

CYCLE

GASOLINE

MOTORS

at lower cost — look to Briggs & Stratton 4-cycle Air-Cooled Gasoline Motors for every application requiring 2/3 HP. to 6 HP.

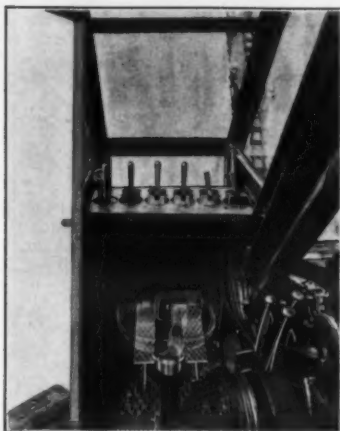
BRIGGS & STRATTON CORP.
MILWAUKEE, WISCONSIN, U. S. A.

Do you wish a really superior dumping unit for handling 2-cu. yd. Detachable Buckets?
SEE OUR MODEL LF
(Load Forward)

DEMPSTER DUMPSTER

For any 1½-ton truck
NO COUNTERWEIGHT
OVERHANG
SIDEWAY
All the load on the chassis.

DEMPSTER BROS. INC. Knoxville, Tenn.



A single lever hoist and dipper trip is a feature of the new Buckeye Clipper shovels.

Single Lever for Hoist, Dipper Trip

Announcement has been made by the Buckeye Traction Ditcher Co., Findlay, Ohio, that its Model 50 1/2-yard, Model 60 3/4-yard and Model 70 3/4-yard Clipper shovels are now featured by a single lever for controlling both hoist and dipper trip operations, making it unnecessary for the operator to reach for a second lever in order to dump the dipper load.

These and all other operations in the working cycle are vacuum controlled through the patented Mevac system, the vacuum control developed by Buckeye engineers. Six toggle levers control all operations and reduce operator fatigue to that of driving a modern automobile, according to the manufacturer. Another feature claimed for this control system is that it eliminates condensation moisture and freezing trouble and is not affected by temperature or climatic conditions. Also, vacuum control allows the operator to retain the "feel" of the work on the dig and hoist actions.

Portable Saw Table

The Van Dorn Electric Tool Co., Towson, Md., has recently added to its line of portable electric saws a portable saw table as a piece of auxiliary equipment. This saw table can be knocked down to be taken out on the job, set up quickly, and used to convert the No. 85 Quick-Saw to saw-table use for cutting, ripping, beveling and similar opera-

tions.

This table is made of sturdy heavy-gage metal with demountable legs, an adjustable ripping guide and clamps to hold the saw in place. The saw table of the portable saw locks in place in the center of the table top and all depth and angle adjustments on the No. 85 Quick-Saw can be made in saw-table use.

Literature describing both the Quick-Saw and this new portable saw table may be secured by interested contractors and state and county highway engineers direct from the manufacturer by mentioning this item.

Registration of Aliens

As part of the national defense program a nationwide registration of aliens will be conducted from August 27 through December 26 by the Immigration and Naturalization Service of the Department of Justice. This registration, which will take place in the post offices of the nation, is made compulsory by the Alien Registration Act of 1940, which

requires all non-citizens to register during the four-month registration period. All aliens 14 years or older must be registered and fingerprinted and alien children under 14 must be registered by their parents or guardians.

Specimen forms listing the questions which will be asked of aliens are being distributed in order to make the actual registration easier. They are available at all post offices. The purpose of this registration is to determine exactly how many aliens there are in this country, who they are and where they are. Both President Roosevelt and Solicitor General Biddle have pointed out that there is no stigma attached to such registration and that it can not prove harmful to law-abiding non-citizens.

Earl G. Harrison, Director of Registration, has asked the cooperation of all employers who may have alien employees in seeing that they are informed of the necessity of registering and that they do so within the registration period. A fine of \$1,000 and imprisonment of six months is prescribed by the Act for

failure to register, for refusal to be fingerprinted, or for making registration statements known to be false.

Excavating Equipment

A bulletin describing in detail and illustrating Sauerman power drag scrapers, slackline cableways and scrapers, tower excavators and tautline cableways has recently been issued by Sauerman Bros., Inc., 464 S. Clinton St., Chicago, Ill. These machines are used for excavating and conveying earth, gravel, clay, loose rock and minerals. Handling capacities range from 10 cubic yards per hour to 800 cubic yards, and power is supplied by motors or engines from 15-hp to 500-hp. Operating spans are from 100 to 1,500 feet. Illustrations in this bulletin show some of the important mechanical features of Sauerman scraper and cableway equipment and a few of its many applications.

Copies of this Bulletin No. 150 may be obtained direct from the manufacturer by mentioning this item.

For Pennsylvania's Turnpike TELSMITH EQUIPMENT Served in These Twelve Commercial Quarry Plants



Contractors' Service Corp.
Shade Gap, Pennsylvania



Chambersburg Stone Co.
Chambersburg, Pa.



Binkley Bros. & Ober
Dry Run, Pennsylvania



New Enterprise Stone & Lime Co.
Everett, Pennsylvania



Shippensburg Stone Co.
Shippensburg, Pa.

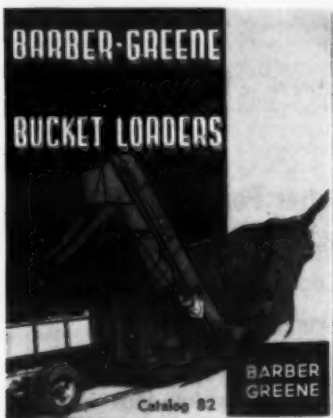


H. B. Mellott
McConnellsburg, Pa.

OTHER PLANTS (not shown) USING TELSMITH EQUIPMENT: Hunkin-Conkey Construction Co., Somerset, Pa.; J. F. Sours, Carlisle, Pa.; Vang Crushed Stone Co., Connellsville, Pa.; Pennsylvania Supply Co., Harrisburg, Pa.; Lycoming Silica Sand Co., Montoursville, Pa.; New Enterprise Stone & Lime Co., Roaring Springs, Pa.



Write for Quarry Plant Bulletin QP-34



S-82

34 JOB PHOTOS...

The new Barber-Greene Bucket Loader Catalog 82 shows 34 photos of B-G Loaders saving time and money on different types of work including: truck loading from stock piles, road shoulder cleanup, top soil stripping, reclaiming, screening, covering green concrete, unloading railroad cars, loading scarified base, etc. Also shows specifications and accessories for B-G Bucket Loaders. Write for Catalog 82.

BARBER-GREENE

50 Church St.
New York City

SMITH ENGINEERING WORKS, 4014 N. HOLTON STREET, MILWAUKEE, WISCONSIN

713 Commercial Trust Bldg.
Philadelphia, Pa.

81 Binney St.
Cambridge, Mass.

Roanoke Trac. & Expt. Co.
Roanoke, Va.

Charleston Trac. & Expt. Corp.
Charleston, W. Va.

Brundis M. & S. Co.
Louisville, Ky.

Better Spreading Of Rock Asphalt

**Double Compression Ended
And Better Blending of
Center Joint Possible Now
Because of Simple Blade**

† WHEN we visited a state construction unit spreading a 2-inch surface of rock asphalt on a prepared road-mix bituminous base last summer, about 20 miles south of Fort Wayne, Ind., we were impressed with the absence of a center joint line, in spite of the fact that the 20-foot surface was being laid in two 10-foot strips.

The Project

On this particular section, Kyrock rock asphalt was hauled about 3 miles from Warren, Ind., by trucks hired by the state. These trucks delivered the rock asphalt to the hopper of a Jaeger bituminous paver. The material was heated to 200-225 degrees F. at Warren, and when laid had a temperature of not less than 170 degrees. The trucks backed up to the machine and raised their bodies so that the material dumped into the hopper, the clutches were released and the truck was pushed ahead by the Hercules-powered Jaeger bituminous paver. This machine is propelled by crawler traction.

Following the spreader, when laying the initial 10-foot strip, were two lute men, one for each side. These workmen cross-luted the rock asphalt to produce a uniform surface. If needed, additional rock asphalt was cast over the surface during cross-luting.

When the final or second strip was laid, two lute men and one raker followed the machine. Throughout the length of the work, the center joint was first blended with a rake, and then a lute was used to produce a uniform surface, as experience has shown that this removes the old line or seam at the center joint. One or two men evened the edges to a line to produce a clean straight pavement edge.

The progress of the machine was about 16 feet per minute, or 960 feet per hour, so that one mile of 10-foot strip was spread in about 5½ hours. A 10-ton Huber 3-wheel gas-powered roller compacted the rock asphalt when properly cured.

Work of the Extra Blade

Since the bituminous paver had been set for 11 feet 9 inches wide, in running the second 10-foot strip for a 20-foot surface, it would necessarily have one track running on the initial 10-foot strip. This would subject the edge of the initial strip to double compression. In order to eliminate this, and this scheme has proved most effective in Indiana, a short section of grader blade was bolted on the left front shoe of the spreader, as illustrated, and let down when spreading the second strip, so that it bladed off all of the previously spread rock asphalt from the first strip for a width sufficient to permit the treads of the spreader to run on the base. After



C. & E. M. Photo

This blade, attached just ahead of the left crawler on a Jaeger bituminous paver, shown at the right, is used on asphalt surfacing in Indiana.

the machine had passed, the blender men raked this material back and it was rolled as additional width of the second strip spread.

Personnel

The front blade for the spreader is

an idea of Larry Myers, Project Engineer, State Highway Commission of Indiana, working in the Fort Wayne District. William Everett is Assistant District Engineer of Maintenance, both men working under the supervision of Roy Biberstine, District Engineer.

All Types of Signals For Railroad Crossings

A complete line of railroad-crossing signal equipment for effective economical crossing protection is manufactured by the Western Railroad Supply Co., 2330-2360 So. Ashland Ave., Chicago, Ill.

Among these are the Model 6 flashing-light rotating-disc highway crossing signal which rotates the "Stop" sign so that it shows only when it means "Stop." Another is the Model 11 Autoflag signal-automatic gate combination showing swinging banners with illuminated red lamps operating in unison with flashing lights on automatic short arm gates. These are only two of a wide variety of signals designed to meet all grade-crossing situations and to offer effective protection at such hazards on the highways.

Literature describing all types of signals and neon highway signs may be secured by interested state and county highway engineers direct from the manufacturer by mentioning this item.

HD-14 Diesels put on such a paying performance ... ran up so many trips on average hauls ... the superintendent figured they would pay off even on his 1800-foot haul. They took over that long haul and PAID OFF—at the rate of six trips per hour! Conservatively estimating 9 pay yards to a load ... that's over 54 PAY YARDS per hour for each outfit. They kept borrow pit, cut and fill level,

ALLIS-CHALMERS
TRACTOR DIVISION—MILWAUKEE, U.S.A.

DOUBLE-POWERED GENERAL MOTORS DIESEL ENGINES—With the General Motors 2-cycle Diesel engine you get twice as much power as a 4-cycle Diesel with the same number of cylinders, bore and stroke. There are no waste strokes—every down

too—no 'dozer or blade was needed. To pile up yardage ... use FASTER Diesel Power. We will gladly prove its money-making possibilities ... on the world's best proving ground—your job. 3 SIZES—HD-7, HD-10, HD-14 • 54 TO 108 DRAWBAR H.P.



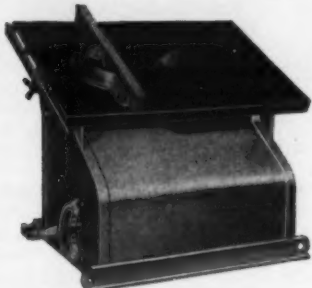
stroke is a POWER stroke. There are no expensive, complicated parts. It's remarkably simple. The 2-cycle Diesel starts instantly, delivers more power per pound of weight—smooth, vibrationless power—at lower operating and maintenance cost.

**Guaranteed
for One Year!**

GRIFFIN

WELLPOINTS and PUMPS

Insist on this guarantee when next ordering dewatering equipment.
THERE'S A DIFFERENCE — INVESTIGATE
GRIFFIN WELLPOINT CORP.
725 East 140th St., New York, N.Y.
Phone: MEIrose 5-7704-5



The CMC Kost Kutter Sr.

New Models Added To Power Saw Line

The Construction Machinery Co., Waterloo, Iowa, has recently issued a new illustrated bulletin describing the three models of power saws now being made by that company. The new Kost Kutter Jr. and Sr. models were added to the line this year and all three units are completely streamlined, safe to operate, and easy to move about on the job or from one job to another.

In addition to the new Kost Kutter models, this company also makes the CMC power Sawyer, a speedy portable and easy-to-operate rig for heavier work. Copies of this new bulletin, which contains information on all of these units, may be secured by interested contractors and state and county highway engineers direct from the manufacturer.

New Build-Up Rod For Worn Castings

The new Amsco Mo-Mang welding rod, recently announced by the American Manganese Steel Division, American Brake Shoe & Foundry Co., 389 E. 14th St., Chicago Heights, Ill., is described as a low-cost manganese-molybdenum steel welding rod for building up worn high-manganese, carbon-steel and grey iron castings. It is available in 18-inch lengths in the bare form for straight direct-current welding and in the combination coated form for both direct and alternating-current applications.

Amsco Mo-Mang is not intended to replace Amsco nickel manganese, which is for applications that demand high tensile strength or extreme shock resistance or both, but is recommended for straight build-up welding to compensate for wear as encountered by bucket lips, crusher hammers, jaws, and similar applications. For these purposes Amsco Mo-Mang is claimed to be a satisfactory and economical welding rod.

A new bulletin W-30 and samples for test may be secured by those interested direct from the manufacturer by mentioning this magazine.

New P & H Excavator Dealer

The Harnischfeger Corp., Milwaukee, Wis., has announced the appointment of the Shaw-Newlin Co., Highway 65 South, Chillicothe, Mo., as exclusive agent for Models 100, 150 and 255 in the P & H excavator line. Shaw-Newlin will operate under the supervision of the Harnischfeger Kansas City Office.

SAND'S-STEVEN'S Line & Surface LEVEL



Endorsed and Adopted by Road Builders and Contractors

Level is easily and quickly attached to line. Special feature construction prevents accidental detachment from line. Construction is sturdy, and accuracy guaranteed.

SAND'S LEVEL & TOOL CO.
8821 Gratiot Ave. Detroit, Mich.

Roll Crusher Line Has Been Redesigned

The entire line of Cedarapids roll crushers, made by the Iowa Mfg. Co. of Cedar Rapids, Iowa, has been redesigned, incorporating several new mechanical and structural features. Smoother operation, longer wear and lower power consumption are provided in all sizes of these crushers through the use of pinion and gear drives from countershaft to stationary shaft and by the use of finger timing gears for the transmission of power from the stationary to the floating roll. Both the gear and pinion and the finger gears are completely enclosed and run in oil.

The roll shells are mounted on tapered cores by means of three sectional wedges. The shell is tapered to correspond so that when the bolts are tightened the tension is exactly the same all around the shell and is held firmly without slipping. Adjustment of the opening between rolls can be made very easily by removing or inserting shims in a slot

on top of the frame. Heavy helical chrome vanadium steel wire springs keep the proper tension on the floating roll so that the opening between the rolls remains constant under proper working conditions. If the uncrushable material should be exceptionally large, shear plates at the ends of the springs relieve the tension entirely.

All sizes of Cedarapids crushers are equipped with anti-friction bearings. Seals confine the lubricant and prevent the entrance of foreign matter to the bearings. The entire countershaft and bearing assembly is completely enclosed in a tubular steel housing. Bearings are placed far out on the shaft, one bearing near the hub of the flywheel and the other near the pinion.

The frame of these crushers is of welded, riveted and cross-braced I-beam construction; the roll shells are of manganese steel, the flywheel extra-heavy semi-steel; the countershaft is equipped with Timken tapered roller bearings and the roll shaft with SKF cylindrical roller bearings.

Copies of a new bulletin on this line of Cedarapids crushers, which are available in 16 x 16-inch, 24 x 16-inch, 30 x 18-inch, 30 x 22-inch, 40 x 20-inch, and 40 x 24-inch sizes, may be secured direct from the manufacturer.

Dow Joins Asphalt Institute

Announcement has been made by J. E. Pennybacker, Managing Director, The Asphalt Institute, of the appointment of Allan W. Dow as Consulting Technologist. This is a new post designed to complement the field work of the Institute's district engineers.

Mr. Dow, formerly of A. W. Dow, Inc., served for 12 years as Chemist for the Engineering Department of the District of Columbia, and supervised the manufacture and laying of all asphalt and other paving materials used in the District. He is a charter member of the American Institute of Chemical Engineers and a past president of the Association of Asphalt Paving Technologists.



BAKER SNOW PLOWS WILL GET YOU THROUGH

Winter and snow are just around the corner. But you need not worry about keeping streets and highways clear, if you are adequately prepared with Bakers.

You can count on Bakers for years of exceptional performance, because their outstanding design and sound construction are the result of 32 years of experience in building good snow plows. That's why you'll find Bakers on the job in practically every city and state where snow removal is a problem.

Baker Snow Plows for motor trucks are built in a variety of sizes and types to cover every need. There is a complete new line of Landside Trip-Blade Plows for any make of truck, improved reversible trip-blade plows and a complete line of "V" type models—all leaders in their field.

Investigate the advantages of Bakers—write for our new catalog now.

Yours for the asking—our attractive new Bulletin 829 on "Snow Plows for Motor Trucks," containing complete information on all Baker Plows, including many entirely new models.

Baker also builds snow plows for various tractors.

In requesting information, state model and make of tractor.



THE BAKER MANUFACTURING CO.

585 Stanford Ave.,

Springfield, Illinois

America's Oldest Manufacturer of Snow Plows for Streets and Highways

BAKER SNOW PLOWS

Use of Contracts On WPA Projects

Sponsors May Now Supply Their Contributions of Materials, Services and Machines by Contract

AN arrangement which makes possible increased participation by private contractors in the public works undertakings of WPA sponsors and at the same time creates additional opportunities for relief employment is now in operation in a number of states. While the plan is still in the development stage, and hinges, as does all WPA activity, upon the action of local project sponsors, it nevertheless points the way toward closer cooperation between contractors and the Federal Works program.

The plan calls for WPA participation in a particular public undertaking through the medium of an approved project the same as before; but it permits the sponsor to participate or meet his obligation through the medium of a contract to furnish his share of the supervision, labor, materials and equipment. On projects of this type, WPA participation will consist of furnishing such necessary labor as may be available from the relief rolls, and part of the materials and equipment, as in the case of all other WPA projects. The contractor becomes the representative of the sponsor.

Advantages of Plan

The availability of WPA funds for part of the labor and materials for projects other than those operated by force account should make possible an expansion of certain types of work. For example, states and counties with fixed appropriations for highway work will be able to spread them over a greater number of projects by availing themselves of WPA labor. At the same time, this procedure will enable sponsors, who so desire, to make use of the organization, training and skill of private contractors.

Under this plan it will also now be possible to operate projects which call for large and extensive equipment. In many cases, this has not been possible previously because the sponsor did not have such equipment available and the use of WPA appropriations for such purposes is limited by law.

Not Entirely New Idea

This plan is not a change in policy on the part of the WPA nor is it an entirely new idea. There were certain localities where interest was sufficient to warrant testing a modified contract procedure as early as 1936, and similar tests and studies have been in progress since then.

During 1938 and 1939 contract operations increased gradually. An extensive program under a contract procedure was initiated in New Jersey in connection with its state highway work, and by the end of 1939, increasing interest was evidenced by both public officials

and contractors' associations, according to WPA.

A detailed study of the contract operations in those states where they had had their principal development was made and, while there was a considerable variation in the arrangement between sponsors and contractors in the various states, it was decided that interest and experience had advanced sufficiently to justify formulating the basic principles in a nation-wide procedure.

Operations May Vary

It is expected that local conditions and the attitude of sponsors and contractors will cause operations under this procedure to vary from state to state. Experiences within the state, the extent to which sponsors are willing to operate such projects, and the degree of cooperation given by contractors will play a large part in formulating further refinements of the policy.

For this reason, no attempt has been made so far to define the extent to which WPA should attempt to furnish skilled

workers. A large part of WPA participation will be that of furnishing unskilled or semi-skilled workers. However, where there are a large number of skilled workers in need of jobs, the WPA has the responsibility of affording them every opportunity for work at their respective trades.

Regulations

There are certain stipulations which will apply to the contract arrangement. For example, sponsors may follow the usual contractual procedure but it must be made clear to prospective bidders just what participation is expected from WPA. Bids submitted are to be for the entire work, less the portion of labor and materials to be supplied without cost to the contractor. The emphasis on such projects is therefore on the contract with incidental WPA participation, and not on the WPA project with incidental participation on the part of the sponsor through a contractor.

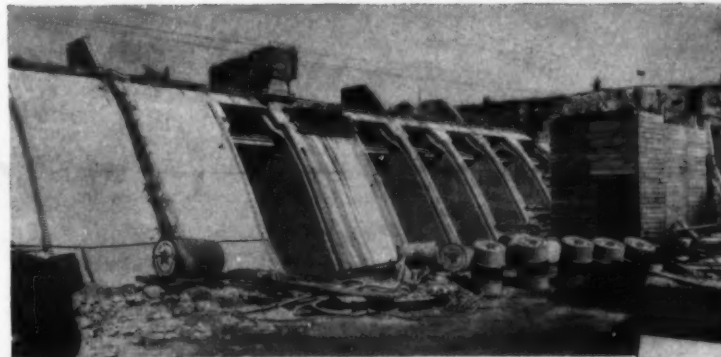
Under this arrangement, the WPA is in no sense a party to the contract, nor

will the WPA participate in or have anything to do with the normal and proper functions of the contracting officer. The preparation of specifications, other than those referring to WPA participation, the form of the contract, the award of the contract, and the inspection of the work are considered such normal and proper functions.

This does not preclude such inspections as the WPA may deem necessary to determine that the work conforms with the project approval and with WPA rules and regulations. Rules and regulations governing employment, including hours of work, monthly earnings, and safety regulations, current at the time of project operation, are of course applicable to all labor furnished by the WPA.

Don't wait until snow starts falling to prepare for its removal. Careful checking and ordering the necessary new equipment now will insure your being fully prepared to handle the snow when it comes.

Contractors Report OUTSTANDING RESULTS



...at Possum- Kingdom Dam Project

THE POSSUM-KINGDOM DAM on the Brazos River near Mineral Wells, Texas. Construction by C. F. Lytle and Al. Johnson, and R. W. Briggs & Co. ... Lubricated by Texaco.



BRIGGS' Allis-Chalmers 40" x 42" Jaw Crusher handled 325,000 yds. of aggregate in 14 months, without a bearing adjustment. Texaco Marjak used.



THESE TWO Sullivan Balanced Angle Air Compressors are subjected to heavy loading, yet are always up to maximum efficiency. Texaco Algol Oil is given full credit for its part in this performance.



SHOVELS AND TRUCKS operated by R. W. Briggs & Co. are always at peak, lubricated with Texaco Marjak, Thuban, Crater.

RUSHING completion of the Possum-Kingdom Dam Project, Mineral Wells, Texas, the C. F. Lytle and Al. Johnson Construction Co., and R. W. Briggs & Co. have enjoyed long, continuous service from their equipment.

Both of these contracting firms freely give credit to the lubricants used . . . TEXACO.

In 14 months, a big jaw crusher has handled 325,000 cu. yds. of concrete aggregate without need of a bearing adjustment. It is lubricated with Texaco Marjak.

On shovels, draglines and "Cats" they have had similar success . . . using Texaco Ursa, Marjak, Thuban, and Crater.

In 3 big air compressors operated by Lytle & Johnson

Construction Co., Texaco Algol Oil keeps valves active and ports clean, resisting gumming and hard carbon formation. What little carbon forms is soft, fluffy, harmless.

Trained lubrication engineers will gladly cooperate in making savings with Texaco Lubricants in your equipment. Just phone the nearest of more than 2300 Texaco warehousing points in the 48 States, or write:

The Texas Company, 135 E. 42nd St., New York, N. Y.

Texaco Dealers invite you to tune in The Texaco Star Theatre—starring Kenny Baker and Frances Langford—Every Wednesday Night—Columbia Network, 7:00 E.D.T., 8:00 E.S.T., 8:00 C.D.T., 7:00 C.S.T., 6:00 M.S.T., 5:00 P.S.T.



TEXACO ALCAID, ALGOL, AND URSA OILS

1869
Pence
CORRUGATED METAL CULVERTS

Easily installed—no delay and no maintenance. Guaranteed to meet U. S. and State Highway Specifications.
Durable . . . Permanent Low Cost

Phone or write
PENN METAL CORPORATION OF PENNA.
Oregon Avenue & Swenson Street, Philadelphia, Pa.

Handling Concrete For Pinopolis Job

(Continued from page 2)

of clay are being carefully controlled to give the desired workability and strength. The cement is delivered in specially designed box cars and transferred from the cars to the bin above the mixers by air, using a Fuller-Kinyon air-activated cement conveyor weighing 2,500 pounds, capable of unloading 90 barrels of cement per hour, and lifting it through a 4-inch pipe 70 feet to the cement bin above the mixer. This machine is operated by one man who wears a respirator covering his mouth and nose. No intermediate cement storage is provided, it being cheaper in this case to pay demurrage on the cars than to build a cement storage bin.

The sand is hauled to the site of the job in a fleet of five Ford V-8 trucks pulling Fruehauf 1½-ton 9-cubic yard trailer bodies. It comes by highway from a sand pit near Bonneau, S. C., some 9 miles from the job. This sand pit was opened up specially for this work by the Becker County Sand & Gravel Co., which has installed at the pit a complete washing and segregating plant. Very fine sand comes from another pit on the Black Oak Road some 5 miles upstream from the dam site. Coarse aggregates come to the job by rail from Lugoff, S. C., and are also furnished by the Becker County Sand & Gravel Co.

When arriving on the job, the sand is dumped into freight cars which are hauled along with the gravel and coarse aggregates up an incline and dumped from bottom-dump gondola cars into storage bins below the railroad trestle. These storage bins hold 500 tons of fine sand, 15 tons of coarse sand, and 1,000 tons each of ¾, 1½, 2½, and 6-inch stone. The 6-inch cobbles come from the James River near Dutch Gap, Va., by rail and are supplied by the Richmond Sand & Gravel Co.

Below these storage bins is a tunnel made of 2-inch x 6-inch timbers and containing a 30-inch Barber-Greene conveyor which moves the aggregate at the rate of 318 feet per minute to the top of the mixer plant. No rock ladders are used and the storage bins are kept relatively full to eliminate a long drop and

consequent excessive breakage.

The mixer plant is a standard Blaw-Knox plant composed of two 2-yard Koehring tilting mixers below semi-automatic weighing batchers which are below a set of bins. These bins are fed by the 30-inch conveyor belt from the tunnel below the storage bins and by the air-activated Fuller-Kinyon cement unloader. The bins above the weighing batchers hold 450 to 500 barrels of cement, 18 cubic yards of fine sand, 24 cubic yards of coarse sand, 34 cubic yards of ¾-inch gravel, 30 cubic yards of 1½-inch gravel, 34 cubic yards of 2½-inch gravel and 24 cubic yards of 6-inch cobbles.

On the batching floor of the mixer plant are rooms for the plant operator and for the concrete technicians. Automatic recording apparatus and consistency indicators are in glass cabinets in full view of the plant operator and inspectors.

Concrete

The concrete used in the construction

of Pinopolis lock and power house varies from mass concrete having 6-inch maximum-size aggregate to heavily reinforced concrete having ¾-inch maximum-size aggregate. The water-cement ratio does not exceed 0.6 by weight which is not more than 6¾ U. S. gallons per 94-pound sack of cement. The concrete being produced is 3,000-pounds-per-square-inch concrete at 28 days or better. The slump does not exceed 2 inches, with a mixing time of 1½ minutes. From the mixers the concrete is dumped directly into 2-cubic yard Blaw-Knox buckets on 3-ton International trucks from which the bucket is lifted into place, using steam-driven Clyde Whirleys. The concrete is generally in place in less than 5 minutes after leaving the mixer.

The pours do not exceed 5 feet in height in the straight panel sections and are placed in two lifts of 2½ feet each in such a way that the face is always kept "alive." Each bucketful is vibrated thoroughly, both electric and pneumatic vibrators being used as follows: four

Mall vibrators, each unit run by a 3-hp electric motor at 3,450 rpm; six Chicago Pneumatic Model No. 419 units and ten Electric Tamper & Equipment Co. pineapple-type units.

With the exception of a small section of vertical faces in the power house, all vertical faces are cured with Aquastatic curing compound made by the Solvents & Plastics Co., of St. Louis, Mo., which is placed either by hand or by a Hudson Perfection No. 210 power spray, manufactured by the H. D. Hudson Mfg. Co. This spray is pumped up by hand to 30 to 40 pounds and sprays approximately 10 square feet in five minutes.

Concrete cylinders are taken to determine when to strip forms as well as for 28-day tests. These cylinders are cured with curing compound the same as the finished block of concrete.

Forms

All forms are constructed in a most complete wood-working shop, containing power saws, planers, drill presses (Concluded on next page)

CRANES THAT PAY DIVIDENDS

An owner of four LIMA cranes called at our office recently and told us how completely pleased he was with the performance of his LIMA machines. He said that he had used other makes of cranes, but never in his experience had he ever used cranes that give such thorough satisfaction. This enthusiasm is characteristic of all LIMA users, the world over. LIMA'S balanced design, independent operations, perfect control, and economy of operation have set a new high standard in crane operation everywhere. If you have work for which you will require a crane, by all means see LIMA. Complete information about LIMA cranes built in sizes from 13 tons to 60 tons capacity is yours for the asking.

LIMA LOCOMOTIVE WORKS, Inc.
Shovel and Crane Division
NEWARK, N. J. NEW YORK, N. Y. DALLAS, TEXAS CHICAGO, ILL.
SEATTLE, WASH. LOS ANGELES, CALIF. SAN FRANCISCO, CALIF.
PORTLAND, ORE. PHILADELPHIA, PA. SPOKANE, WASH.
MONTREAL, QUEBEC, CAN. VANCOUVER, B. C.

1. Lima Crane owned by J. J. Drane, Quincy, Mass., demolishing structural steel buildings.
2. Two Lima Cranes owned by S. E. Poston Construction Co., Detroit, Michigan, equipped with 500 and 1000 boom.
3. 60 ton girder being placed by Lima Crane owned by Harbo Structural Steel Co., Inc., New York.
4. Lima Crane owned by R. J. Quiver & Sons Co., Minneapolis, lifting 14 ton load with a 60 foot boom.

LIMA

SHOVELS ¼ YD. TO 3 YD. CAPACITY CRANES 13 TONS TO 60 TONS
DRAGLINES - VARIABLE

Lima Pavecrete Truck Crane owned by Harbor Dept., City of San Diego, Calif.

MADSEN 500 LB. BATCH CAPACITY PORTABLE ASPHALT PLANT



A complete mixing plant with elevator, combination dryer and screen, 4-compartment aggregate bin, weigh box with multiple beam scale, heavy duty twin-shaft pug mill mixer and incorporating the Madsen patented jack and asphalt injection system, built within 8-ft. maximum road clearance, 13-ft. 6" overall height, complete with asphalt tank and boiler unit, pumps, etc.

A complete plant in every way. Rated at 15 tons per hour, users claim as high as 32 tons per hour. The ideal plant for small municipalities and small contract work.

MADSEN
IRON WORKS
HUNTINGTON PARK, CALIFORNIA

Work at Pinopolis Lock, Power House

(Continued from preceding page)

and grinders. Draft-tube forms and scroll-case forms are made up to two layers of 3/4-inch pine sheeting covered with one layer of 1/2-inch cypress. Ribs and braces are of 2 x 4, 2 x 6, 2 x 8, and 2 x 10 timbers. Panel forms are made of 3 x 6 wales, 2 x 10 studs, 1 1/2-inch tongue-and-groove sheeting faced, where required, with 3/16 inches of Masonite. Panel forms are set on steel scaffold brackets which provide a walkway outside the form, and these forms are braced with Richmond Screw Anchor Co. Tylags and Tyloops.

Major Units of Equipment

- 2-cubic yard Koehring 54-S tilting mixers
- Blaw-Knox automatic batcher plant
- 36-inch x 300-foot Barber-Greene conveyors
- Ingersoll-Rand Type 40 compressors with a capacity of 312 cubic feet each per minute
- Pennsylvania Model 3A 12 x 18-inch compressor, with a capacity of 240 cubic feet per minute
- 4-inch Rex Speed Prime 40,000-gph pumps
- 8-inch Moretrench electric 120,000-gph pumps
- 1-inch Barnes pump, with a capacity of 4,800 gph at 500-pounds pressure
- 3-inch Wesco concrete-curing pumps, with a capacity of 12,000 gph at 100-pounds pressure
- 75-ton Baldwin locomotive
- Whitely 30-ton crane, with a boom length of 100 to 125 feet and a weight of 85 tons
- Koehring 401 18-ton crane, with a boom length of 40 feet and weighing 45 tons
- Koehring 401 15-ton crane, with a boom length of 40 feet and weighing 38 tons
- Caterpillar Sixty
- Model L Allis-Chalmers
- International 1940 model D-40 3-ton trucks
- 1919 V-8 Ford truck
- Wilson electric-driven 300-ampere electric welder
- Lincoln gas-motor-driven 300-ampere electric welder
- Complete acetylene cutting and welding equipment
- 18-inch x 6-foot Lathe for metal work
- 24 x 18-inch Lathe for metal work
- 24-inch Shaper
- Threading machines
- Large drill presses
- Small 1/2-inch bench drill presses
- 14hp Black & Decker bench grinder
- 1/2-inch Black & Decker valve refacer
- 40-ton Atlas hydraulic press
- Rex 10-S concrete mixer
- Gardner-Denver 3 1/2 x 5-inch power grouting pump
- Electrically-operated power cut-off saws
- Electrically-operated combination planer and rip saw
- Electrically-operated band saws
- 6hp table rip saw
- Drill press
- Bench grinder

Contractor's Camp

Complete camp facilities are provided for in the contract and have been constructed by the Central Engineering Co. The white camp, situated in a pine woods, is composed of seven octagonal buildings each housing twelve men in six double-decked bunks. These buildings are grouped around the bath house which contains a shower room with ten showers, dressing room, wash rooms and toilets. The colored camp, situated at some distance from the white camp, in another group of trees, is composed of two long bunk houses housing forty-four men each in twenty-two double-decked bunks. The bath house is the same as provided for the white camp.

Commissaries are provided for both the white and colored camps, both capable of seating 200 persons. Buildings in camp were also constructed for the Federal Works Agency, Public Works Administration office, Harza Engineering Co. office, Central Engineering Co. office, concrete cylinder storage, core boring storage, as well as a viewing stand with eating concession and toilets. Adequate parking facilities are provided for all visitors, workmen and salesmen. Parking areas are marked off with logs after the manner of the U. S. Park Service and areas in between were planted with grass.

Personnel

Pinopolis Lock and Power House is being constructed by the Central Engineering Co., of Davenport, Iowa, Otto G. Nobis, Vice President; Thomas E. Fieweger, Chief Engineer; Arthur E. Cossens, General Superintendent; C. D. Lyons, General Foreman; W. E. Howlett, Job Engineer; S. A. Fieweger, Office Manager; Vince Connors, Carpenter

Superintendent; Dewey Price, Master Mechanic; J. R. Costin, Night Foreman on the swing shift; and Arthur Lidell, Night Foreman on the graveyard shift.

For the Harza Engineering Co., C. E. Wattles is Construction Engineer, W. R. Buie is Resident Engineer and K. H. Talbot is Concrete Technician.

Highway Departments

Prepare to Battle Snow

Men in charge of highway maintenance and snow removal in the northern states are even now mustering their forces to repel the attacks of Old Man Winter and to keep the vital highways of the nation open. For the grueling service of handling snow 8 and 10 feet deep, Marmon-Herrington all-wheel-drive trucks are proving their efficiency and economy, according to the Marmon-Herrington Co., Indianapolis, Ind.

This company builds a complete line of extra heavy-duty all-wheel-drive trucks up to 70,000 pounds gross capacity, and converts all standard Ford

trucks to all-wheel-drive. Both four and six-wheel-drive models are available in Fords as well as in the larger Marmon-Herrington line. Among their features are low operating cost and road-gripping traction. When the snow season is over, they are just as useful in general road-building and maintenance work.

Further information on these all-wheel-drive units may be secured direct from Marmon-Herrington Co. or from this magazine.

Fewsmith of Robins Dies

William L. Fewsmith, Manager of Publicity and Advertising for the Robins Conveying Belt Co., Passaic, N. J., died on August 15 after a brief illness while on vacation at Port Carling, Ontario. He was 61 years of age. Mr. Fewsmith joined the Robins organization in 1913 as a civil engineer and had been continuously employed in the capacity of both civil and mechanical engineer until 1924 when he was appointed head of the Publicity and Advertising Department.



More Alike than Peas in a Pod!

American Cable

TRU-LAY *Preformed* Wire Rope

Uniform in Quality—is a universally acknowledged characteristic of American Cable's Wire Ropes.

Uniform in Service. Being uniform in quality American Cable's Ropes are naturally uniform in service. When American Cable introduced TRU-LAY Preformed, in 1924, we gave all industry a rope that far outlasted ordinary non-preformed, our own make included. Here, too, in increased service, is seen uniformity, for when one TRU-LAY Preformed Rope does a job unusually well, the second or twenty-second TRU-LAY Rope will do equally well.

Uniform in Safety. TRU-LAY Preformed is a safer rope. Its crown wires lie flat and in place so that there is less danger of their wickering out and jabbing workmen's hands, which often causes blood-poisoning. TRU-LAY handles easier and faster, resists kinking and whipping, spools on drums better and rotates less in sheave grooves. TRU-LAY requires no seizing when cut and will not fly apart when broken. Specify American Cable's TRU-LAY Preformed for your next line.

BUY ACCO QUALITY—whether in American Cable Division's Ropes—American Chains (Weed Tire Chains and Welded or Weldless Chains)—Campbell Abrasive Cutting Machines—Page Wire Fence—Page Welding Wire—Reading-Pratt & Cady Valves—Wright Hoists or any other of the 137 ACCO Quality Products.

AMERICAN CABLE DIVISION
WILKES-BARRE, PENNSYLVANIA

District Offices: Atlanta, Chicago, Detroit, Denver, Los Angeles,
New York, Philadelphia, Pittsburgh, Houston, San Francisco

Green Signifies Full Speed Ahead for National Preparedness



**THE STRONGEST
GEARED
POWER
FOR ITS
WEIGHT
IN THE
WORLD**

ALL STEEL HAND HOIST

SEATTLE, U.S.A.

COMPACT—POWERFUL—SAFE
"For use where power is not practical or available"

Manufactured in 2, 5 and 15-Ton Sizes.
For capacity comparison, 1/2" cable used:

2-Ton "Lightweight"	75 ft.
5-Ton "General Utility"	250 ft.
15-Ton Triple-Geared "Special"	1200 ft.

Patent instant gear change and positive internal brake that never fails, and will lock load.

Price, f.o.b. Seattle

Gear Ratio	Weight	Price
2-Ton 4, & 23 to 1	60 lb.	\$ 50
5-Ton 4, & 24 to 1	110 lb.	\$ 75
15-Ton 4, 19 & 109 to 1	680 lb.	\$250

BEEBE BROS.
3724 6th Ave., So., SEATTLE, WASH.

Warehouse stocks for dealers' supply: Seattle—Chicago—Brooklyn—Newark. Complete literature and list of dealers in Principal U. S. Cities and Foreign Countries Gladly Mailed.



County Organization For Year-Round Work

One Central Garage for Repairs at Fairmont and Four Storage Garages in Martin County, Minn.

(Photo on page 48)

“SNOW removal isn't such a problem. Just wait till it quits blowing and then clear the roads with heavy equipment. It is useless to do it any other way,” remarked C. N. Krosch, County Engineer, in his office in Fairmont, Minn., when we interviewed him about the organization of the Highway Department of Martin County. In a county of 720 square miles with 520 miles of county and state-aid roads to be maintained throughout the year, and with only light traffic, that is the sensible attitude toward snow removal. Mr. Krosch has looked after these roads for 20 years and knows what the problems of maintaining a 100 per cent gravel road system really are.

County Organization

In Martin County there are five commissioner districts from each of which a commissioner is elected to compose the Board of County Commissioners. One of the responsibilities of the commissioners is to appoint the county highway engineer for a term of two years. The commissioners have nothing to do with the maintenance of the roads, but are responsible for the care of county and judicial drainage ditches. They settle disputes regarding town boundaries, and may lay out a county road over an existing town road established by a town board. The county engineer hires all the highway laborers and mechanics and is responsible for the construction and maintenance of the road system, under the general supervision of the Board of County Commissioners.

Financing the County Roads

The sources of revenue for the operation of the county highway department are a tax of one mill payable to the state road and bridge fund which is apportioned back to the counties for construction and maintenance of state-aid roads and a county levy which constitutes the balance of the county road and bridge fund. The county-aid or gas-tax roads are maintained by a refund from the state gas tax to the counties based on the gasoline sales in the county and the miles of county and state-aid roads in the county, and also in such a manner that not less than 3/4 of 1 per cent of the money nor more than 2 per cent may be returned to any one county. In addition the townships in Martin County pay 30 per cent of the construction costs of new county-aid roads where they are built within that township.

Equipment Roster

Martin County is well-equipped with heavy equipment for the maintenance of county roads and for the operation of the heavy V-type snow plows used following the winter storms. The construction and maintenance equipment includes: 1 Caterpillar Sixty tractor; 4 Oshkosh trucks; 3 Caterpillar Auto Pa-

trols; 1 Wausau V-type snow plow; 4 Wisconsin V-type snow plows; 1 Caterpillar V-type plow for the Auto Patrol; 2 Chevrolet 1 1/2-ton trucks; 2 Ford trucks; 1 Adams 12-foot pulled grader; 3 Adams 14-foot pulled graders; 1 Caterpillar pulled grader; 1 equipment trailer; 2 weed-spraying machines; and 2 highway mowers. In addition there is 32 miles of vertical-slat snow fence, about one half of which is stored at the Central Garage at Fairmont and the remainder at the other storage garages.

Central and Storage Garages

Martin County maintains a Central Garage at Fairmont where the heavier work on the county equipment is performed, but there are also storage garages at Truman, Granada, Triumph and Ceylon. The Central Garage is adjacent to the Martin County Fair Grounds, close to the center of the city. The main building is of hollow tile construction 34 x 56 feet in plan, with two overhead garage doors 12 1/2 feet clear height and 16 and 12 feet wide.

The equipment at the Central Garage for the maintenance of the highway units includes a Van Dorn hand electric drill with a wall bracket for use as a drill press. There is a complete lubrication section with Kendall oil lubricants. A coal heater in the center of the garage supplies heated air which is blown through a sheet metal flue so that it is delivered across the floor, thus heating first the portion of the garage where the men are working. A very efficient parts storage room is incorporated in the garage with all-steel bins for parts, effecting considerable economy in space over the usual wood bins. In this same room at the back of the garage there is storage space for miscellaneous mate-

rials over the stairway leading to the basement. One half the basement is given over to a rain water cistern of 16,000 gallons capacity from which the water is pumped by a small domestic unit on the first floor for use in the garage. The other section of the basement is used for storage of oil drums.

Other aids to the repair mechanic are a steel movable tray on casters, several types of grinders, a Lincoln Shield Arc electric welder, and a Blackhawk Porto-Power press. An acetylene cutting and welding outfit completes the major repair equipment.

A wooden storage shed 25 x 100 feet adjacent to the garage is used for the storage of small trucks, signs and has a room for the sign painter. A special shed on the other side of the garage is used for the Caterpillar Sixty.

The Central Garage is in charge of R. D. Shifflett as Foreman who has one helper for the major repair work.

Want information on equipment?
Write to the Editor.

New Excavating Unit

Lima Locomotive Works, Inc., Shovel and Crane Div., Lima, Ohio, has recently issued an attractively colored and illustrated bulletin describing in detail the Lima Type 1201 shovel and dragline. According to the manufacturer, the Type 1201 has all the power and ruggedness of a big machine, plus the speed and economy of the smaller type. It is especially adapted to quarries, drainage and levee work, and heavy construction where capacity is the major requirement.

As a standard shovel it is equipped with a 30-foot boom, 20-foot dipper handle and a 3-cubic yard dipper. For high-lift work a 42-foot boom, 32-foot dipper handle and a 2 1/2-yard dipper can be furnished. When equipped as a dragline, proportionate capacities of buckets can be used, depending upon the length of the boom and the nature of the material to be handled.

Copies of this bulletin, No. 121-A, may be obtained by writing direct to the manufacturer and mentioning this item.

Here's a Sure Way to a PROFITABLE SCRAPER BUY

RATE THE SCRAPER . . . Use this score card. Consistent scraper profits naturally depend on having a good scraper to begin with. To help you select the best, we have developed this scraper check list. Use it as an aid to evaluating scrapers—for more profits.

Check These Important Profit-Assuring Points		LeTourneau Rating
1	Will the scraper you are considering handle all materials—from easy loam to broken rock?	Yes, proved by thousands of jobs.
(a)	Does it have a positive ejection tailgate so the bowl is completely cleaned of wet, sticky materials on every trip?	Yes, 100% positive ejection.
2	Does it operate by means of safe, fast-acting, flexible cable control?	Yes.
(a)	... so the operator can instantly lift the blade to prevent tractor stalling when encountering rocks or stumps?	Yes, split-second control.
(b)	... so you can operate it equally well in sub-zero weather or tropical heat?	Yes, cable is unaffected by heat or cold.
(c)	... so you can easily interchange the tractor with such other tools as Diggers, Rooters and Cranes?	Yes.
3	Has it large diameter tires for light draft and flotation, and of sufficient capacity to handle heavy loads?	Yes.
(a)	Is it built so extra tires can be added to give even more flotation where needed on jobs in unusually soft materials?	Yes.
4	Has it been job proven by customers the world over?	Yes, and without re-designing scraper.
5	What is the manufacturer's generally recognized position in the scraper industry?	Yes, used in 80 countries.
6	Can the manufacturer prove by a weight demonstration that the scraper will consistently deliver and exceed its full claimed capacity? In short—does it deliver “honest yardage”?	First.
7	Are sales and service facilities readily available the world over and through a well-trained dealer organization?	Yes, LeTourneau pioneered accurate “weight” tests.
8	Is the line complete enough so I can select the right size to fit my job?	Yes, from “Caterpillar.”
(a)	Are the big capacity models designed to take full advantage in pay yards of the hauling power of today's bigger powered tractors?	12 sizes—3 to 35 yds.—5 cutting widths.
9	How does list price compare with other scrapers on the basis of comparable tires, blades and net cost per yard of heaped capacity?	Yes, by pusher loading. Cheapest! But see your dealer.

ASK FOR JOB PROOF

After you've checked every scraper point, ask your LeTourneau “Caterpillar” dealer to prove the superiority of LeTourneau Carryalls by a certified load weight demonstration. See him NOW!

LETOURNEAU

PEORIA, ILLINOIS • STOCKTON, CALIFORNIA

TRACTOR OWNERS

Can

SAVE \$500.00

with HAGEN CABLE CLAMPS on Power Control Unit in a year's time.



Fasten or unfasten the cable on Power Control Unit in ten seconds. No kinked or frayed cables to cut off. Saves cable and increases operating time.

Sold with a guarantee that you will be satisfied or your money back.

Price

\$8.50
postpaid

HAGEN CLAMP COMPANY
GLOBE, ARIZONA

Contest for Design Of New Welding Torch

In order to improve its line of acetylene welding and cutting torches, the Alexander Milburn Co., 1424 W. Baltimore St., Baltimore, Md., has announced through its President, Alexander Jenkins, that it will pay \$5,000 for the submittal of a welding torch which is absolutely proof against flash back under the most onerous conditions encountered in certain types of welding.

In order to encourage the best development in torch design, if such a torch is submitted and, in the opinion of a

reputable and independent committee, is found to possess sufficient novel features to be satisfactorily patentable, in addition to the \$5,000 award, patent expenses will be defrayed and a substantial royalty will be paid to the inventor. All communications in regard to the design of such a torch will be treated confidentially.

Precast Concrete Piles And Flat-Base Pipe

Massey Concrete Products Corp., Peoples Gas Bldg., Chicago, Ill., and 50 Church St., New York City, has re-

cently issued two new catalogs, one describing Massey precast concrete piles and the other showing special applications of Massey flat-base and tunnel-section pipe. Catalog Series D, No. 1, gives general information including views showing typical applications of precast concrete piles, line drawings showing details of standard piles, and complete specifications. Catalog Series C, No. 2, describes and illustrates the use of flat-base concrete pipe in the construction of a pedestrian underpass, and a conveyor tunnel.

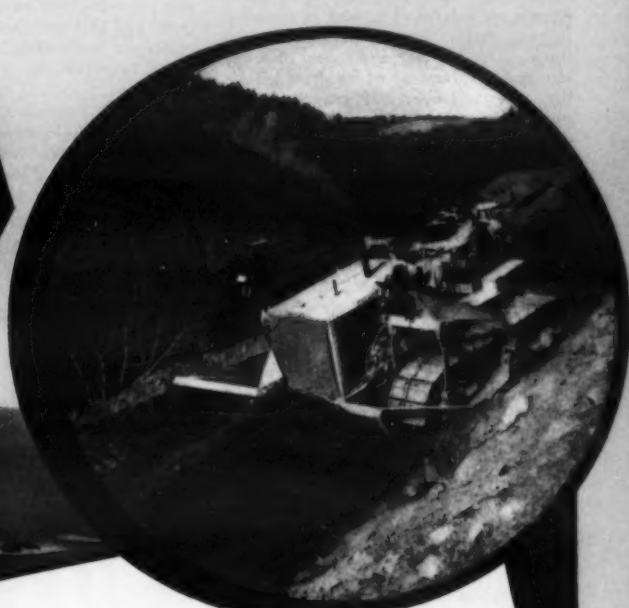
Either or both of these catalogs may be obtained from the manufacturer.

New Circular Describes Concrete Vibrator Sets

Circular No. 24-D, recently issued by the White Mfg. Co., Elkhart, Ind., describes and illustrates the various models of gasoline-engine-driven and electric-motor-driven vibrator sets for the vibration of mass concrete and of concrete at paving joints and along paving forms. The various features of these vibrators are discussed, as well as the accessories which can be used with any White vibrating outfit.

Copies of this Circular No. 24-D may be secured from the manufacturer.

Melting down MOUNTAINS
AND
Moulding out HIGHWAYS



LANDSCAPES change rapidly—and profits come fast—when rugged, dependable, sure-gripping "Caterpillar" Diesel Tractors apply their powerful push or pull to big-yardage rippers, bulldozers, scrapers and wagons.

On a realignment project on State Highway No. 1, between Jenner and Stewart's Point, California, Guerin Bros., contractors, undertook the excavating and moving of several hundred thousand yards of earth under difficult operating conditions. There were some deep cuts and sizable fills. A number of bridges had to be moved. Before a fleet of "Caterpillar" Diesel Tractors, teamed with LeTourneau Rooter, bulldozers and Carryall scrapers, hums "melted" away, dips were filled, bridge approaches built, subgrades formed. . . . And nearly a month before the scheduled date, the job was done!

Though the punishment they took was severe, the "Caterpillar" Diesels stood up in characteristic "Caterpillar" fashion. Operating cost, through their low maintenance and efficient use of low-cost fuel, was low. . . . Everything about them supported the reputation "Caterpillar" Diesels have gained to become the most widely used track-type tractors in the world.

Look over any "Caterpillar" Diesel-powered job. Watch the yardage roll onto the fill behind "Caterpillar" Diesel Tractors. See how easily "Caterpillar" Diesel Motor Graders handle a variety of jobs that once required hand work or special equipment. Check with the superintendent and hear how "Caterpillar" Diesel Engines bring the same high-grade performance to stationary jobs. Consider the complete and readily available service and replacement-parts facilities behind "Caterpillar" equipment. Then let your "Caterpillar" dealer, and let him show you how you can step up work volume, cut overhead and operating costs by STANDARDIZING ON "CATERPILLAR" DIESEL POWER.

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS

CATERPILLAR

TRACK-TYPE TRACTORS
ROAD MACHINERY
DIESEL ENGINES and ELECTRIC SETS

V
3
7
-
9

S
E
P

4
0

XUM



Diagram of Flexco HD fastener as installed to join conveyor belts.

New Conveyor Belt Fastener Announced

A new size of Flexco HD belt fastener for joining thin light-weight conveyor belts has been added to the line of belt fasteners made by the Flexible Steel Lacing Co., 4607 Lexington St., Chicago, Ill. This new size is known as the No. 1 1/4 and is used for joining belts from 5/15 to 1/2-inch thick. The holding bolts are of large size and yet, because of its short length, the new fastener will travel around pulleys as small as 14 inches in diameter.

This new No. 1 1/4 fastener consists of two metal plates which span the joint on opposite sides of the belt and which are drawn tightly together by two bolts through the belting. Bolt heads and nuts are countersunk and the protruding bolts are broken off; the fasteners are flat and smooth on both sides. The template locates the bolt holes slightly farther apart than the bolt centers of the fastener; when the bolts are inserted and drawn down into position, the belt ends are forced together tightly, forming a compression seal which will not let material sift through. The completed joint, since it is a series of separate fastenings, can assume the trough of the conveyor as naturally as the rest of the belt, according to the manufacturer.

Copies of Bulletin No. F-100, containing further details on Flexco HD belt fasteners and also on rip plates, may be secured by those interested direct from the manufacturer by mentioning this item.

Portable Saw Rigs

The No. 33 C. H. & E. portable saw rig is designed to include in one machine the features of both strength and portability, sufficient power for ripping heavy lumber, economy of operation, and adaptability for making all types of cuts with no time lost for setting up and for adding various attachments.

Its construction is sturdy, the heavy

steel table which tilts to a 45-degree angle being mounted on large-diameter half-circle segments supported in rigid cradles at each end of the frame. The table is tilted through a gear mechanism operated by a convenient hand wheel at the front of the machine and it can be locked securely in any position. A new type of arbor and swinging arm construction in the No. 33 gives a straight-line travel through a distance of 16 inches at the maximum height of the saw blade. The saw arbor runs in sealed ball bearings which are carried in an accurately machined arbor arm. The swinging arm is of all-welded box construction, and the pivot points are mounted in roller bearings. Foot and hand levers are provided for easy swinging operation, and the saw arbor can be quickly raised or lowered by means of a hand wheel to adjust the saw to the depth of cut.

Power is furnished by 4-cylinder air or water-cooled gasoline engines up to 15 hp, or electric motors up to 10 hp are available. Power is transmitted

through an endless V-belt drive. Among the safety features are an aluminum saw guard and a sawdust chute built into the frame. The unit is enclosed on all sides with a metal housing to cover all working parts.

Copies of Bulletin No. SR3340 containing further information on the No. 33 saw rig may be secured by those interested direct from the C. H. & E. Mfg. Co., Milwaukee, Wis., by mentioning this magazine.

Concrete Mixer Catalog

The line of Gilson Automix concrete mixers, ranging in capacities from 2 to 3 cubic feet up to the heavy-duty 10-S, and including a variety of tilting and non-tilting, side and end-discharge models, is described and illustrated in literature which Gilson Bros. Co., Fredonia, Wis., will be glad to send on request to those mentioning this item.

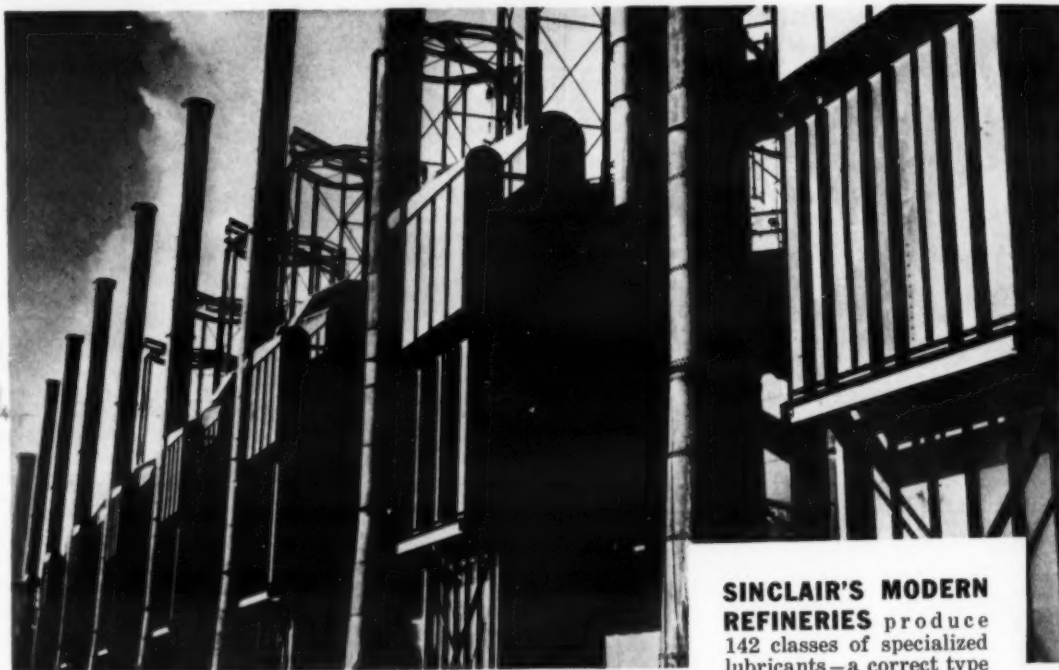
Many of these models are equipped with a power loader and a skip shaker, and all are of sturdy rugged construc-

tion and designed for mixing concrete or cold patch, for highway or general construction work. The usual assortment of mountings are available, with steel or rubber-tired wheels.

New Export Manager Appointed by Roebeling

Announcement has been made by John A. Roebeling's Sons Co., Trenton, N. J., manufacturer of wire rope, electrical wires and cables, and other wire specialties, of the appointment of William P. Laseter as Export Manager to head the company's new Export Division at 19 Rector Street, New York City.

Mr. Laseter, a native of Georgia, has been identified with Latin-American trade since 1919, a goodly portion of those years having been spent in Cuba and Mexico. He goes to Roebeling from the Oil Well Supply Co. where he served as Assistant Manager of the Export Division as well as President of Cia. Consolidada "Oilwell," S. A., its Mexican subsidiary.



SINCLAIR'S MODERN REFINERIES produce 142 classes of specialized lubricants—a correct type for every industrial purpose. For road building and construction machinery...



... **SINCLAIR OILS AND GREASES** offer maximum efficiency under all service conditions. Sinclair products help keep operating and maintenance costs low. Over 2000 Sinclair bulk plant agents are ready to make prompt delivery of Sinclair lubricants and fuels.

LORAIN SHOVEL, "Caterpillar" Diesel powered, used by E. W. Grannis, Fayetteville, N.C., on Buzzard's Roost Dam project. This is being satisfactorily operated with Sinclair Ten-ol and Sinclair Diesel Fuel.



• Boxes placed against front of batch compartments. Lid remains permanently tight until easily opened by spotter. Discharges all the cement at right time—in perfect condition. Reduces labor costs. Speeds up delivery of batch to mixer.

Write Today FOR DESCRIPTIVE FOLDER & PRICES

THE STEVENS METAL PRODUCTS CO.
MILES, OHIO

SINCLAIR INDUSTRIAL OILS

SINCLAIR REFINING COMPANY (Inc.)

2540 W. CERMAK RD. CHICAGO • 10 W. 51ST ST. NEW YORK • 1907 GRAND AVE. KANSAS CITY • 573 W. PEACHTREE ST. ATLANTA • FAIR BUILDING, FT. WORTH

Preformed Rope Aids Work on Airport Job

(Continued from page 7)

Preformed Rope Used

The cranes were equipped with $\frac{3}{4}$ -yard buckets and were reeved with $\frac{1}{2}$ -inch 8 x 19 preformed wire rope for the closing line, regular cable being used generally for the holding line. The work was severe on the cable, due to the abrasive fineness of the river sand. When asked how long the preformed wire rope lasted on the crane, its operator said that it had been so long since he had had to change cables that he could not answer with accuracy. From other reliable sources the life of the preformed wire rope appeared to be upwards of 2,000 hours and one operator reported that since changing the closing line to the preformed type, he was certain it was giving more than twice the length of service.

This is not unusual service to be obtained from preformed wire rope. It is mentioned here because in every excavating job the cost of wire rope is an important item and not infrequently the larger part of maintenance cost. Because of the method of manufacture, that is of preforming each individual strand before the final assembly of the rope, it is exceptionally free of any tendency to kink, overwind on the drum or snap out of the groove when the tension is suddenly released.

Airport of National Importance

Hog Island Airport, which was opened June 15, 1940, is an outstanding development. All main routes of the United Air Lines, American Airways Co., Eastern Air Lines, Inc., and Transcontinental & Western Air, Inc., make regular stops at this airport, providing a service for the metropolitan Philadelphia area not formerly available.

The proximity of the U. S. Navy Yard, the proposed tunnel beneath the Delaware River, and the importance of airports in the national defense program, all contribute to making the completion of the Hog Island Airport of national significance.

Al Blaisdell, Well-Known

Equipment Dealer, Dies

A. C. Blaisdell, President of the Blaisdell Equipment & Supply Co. of Cincinnati, Ohio, and Secretary of the Associated Equipment Distributors, died on July 29 after a long illness.

Mr. Blaisdell was born in Cincinnati, attended school there and began his business career with the Queen City Supply Co., remaining with the firm for 25 years. In 1933 he bought out the equipment division and formed the Blaisdell-Folz Equipment Co. which in 1937 became the Blaisdell Equipment & Supply Co. The company, which has moved to 3752 Montgomery Pike, will carry on with his son as Vice President and General Manager.

One of the founders of the A.E.D., Mr. Blaisdell served as its President in 1926 and held the office of Secretary and Treasurer for the past 12 years.

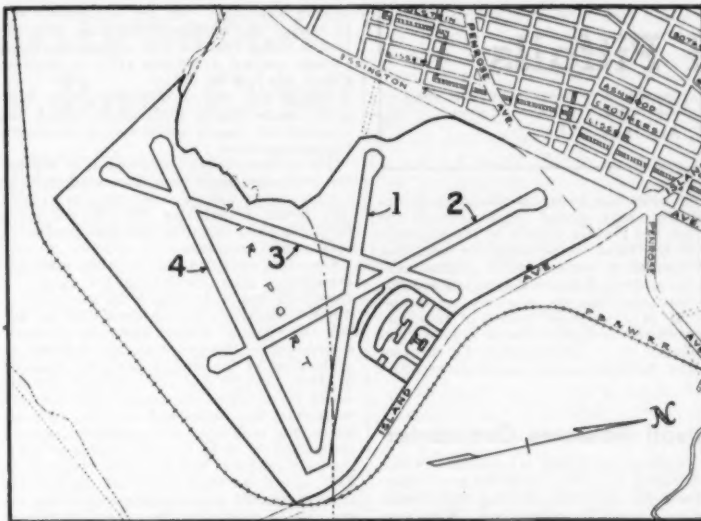


Diagram of the new Philadelphia Airport on Hog Island, showing the layout of the four runways, each of which is over a mile long.

Electric Welding Products

The complete line of Airco electrodes and Wilson electric welding machines is described in a 32-page illustrated booklet recently issued by Air Reduction, 60 E. 42nd St., New York City. The booklet discusses various types of electrodes covering general description, suggested applications, welding procedure, physical properties and a specification table for each type, and offers suggestions as to where each type can be used to best advantage. The rest of the catalog is devoted to electric welding accessories, such as aprons, goggles, brushes, etc.; a page of excerpts from "Welding Symbols and Instructions for Their Use" as published by the American Welding Society; and a detailed discussion of various Wilson electric welders.

Copies of this catalog, No. 103, can be obtained direct from the manufacturer by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

This shovel is 25% BIGGER than it looks

YES SIR, and the PMCO dipper up on the end of that 42-foot boom—32 foot stick is what gives this Lima shovel its extra 25% capacity.

The PMCO dipper is of the modern welded type of construction. All unnecessary and burdensome weight has been eliminated, allowing pay loads 25% greater than are possible with the solid cast type of dipper. Reinforcing at stress points and correct distribution of weight assure that the PMCO dipper will "stand the gaff" on the toughest work.

Like many other leading power shovel manufacturers, Lima is now offering PMCO welded dippers.

Want to make your shovel 25% bigger?

Write for Bulletin 0100. It contains complete information on the PMCO welded dipper—shows how to get full rated capacity from long reach shovels, how to put new life into old shovels.



This Lima Type 1201 Shovel is operating with a $2\frac{1}{2}$ yard PMCO dipper on a 42 foot boom and 32 foot handle, working in a 35 foot cut. A solid cast dipper for this shovel could not be more than 2 yard capacity. PMCO welded construction means 25% more pay-load, 25% more profit.

Established 1880

Be sure it's the

GIANTGRIP
STRAIGHTEDGE

Either Steel or Aluminum

For Checking Concrete Surface

Two useable edges—one sharp-cornered and squared for scraping; the other rounded for line-point straightedging.

ASK YOUR DEALER

L & M Manufacturing Co.

(Division of Mouldie Forge Co.)

16302 BEREA RD., CLEVELAND, OHIO

Avoid Legal Pitfalls

These brief abstracts of court decisions may aid you. Local ordinances or state laws may alter conditions in your community. If in doubt consult your own attorney.

Edited by A. L. H. STREET, Attorney-at-Law.

Negligence During Work

On Streets or Highways

One of the most numerous classes of litigation that grow out of the performance of contracts for street or highway improvements is that arising out of injuries to motorists permitted to use a thoroughfare while under construction. And when the contractor is held to be liable for such an accident, it is usually on the ground that he has failed to use a reasonable degree of care for the safety of travelers.

In the case of *City of Oglethorpe v. English*, 2 S. E. 2d, 733, a contractor laid strips of wood 3 or 4 feet long and 2 or 3 inches wide diagonally in the center of a street, to divert traffic to the sides of the street. English sued the contractor and the city for damages, claiming that some of the boards had been knocked to the sides of the roadway by passing automobiles, and that while he was driving along the street at night his car ran into one of the displaced boards, which caused the steering wheel of his car to lock, thereby preventing him from turning the car at an approach to a bridge and causing it to go over an embankment.

The Georgia Court of Appeals decided that if plaintiff should substantiate his claim by proof at a trial he would be entitled to judgment for damages against the city and the contractor. The decision was based upon an assumption that the city and the contractor knew that the planks had been displaced and were careless in failing to remove them from the path of vehicles.

Strings on Public Jobs

A good-sized book could be written on the subject of legal differences involved between performing a private construction contract and performing a public contract, even though the work to be done under each be of precisely the same character.

One of the most commonly involved points under this head is the rule of law that while a private owner is unlimited in his contracting power, public agencies are strictly limited as to the scope of contracts they can lawfully enter into, and that public contractors are bound to take notice of all limitations on their powers.

A decision rendered by the New York Court of Claims (*Carder Realty Corp. v. State*, 15 N. Y. Supp. 2d, 604) involves a comparatively new angle. It was there decided that where a public contract was entered into, in the light of a statute limiting the hours laborers could be employed on the job and requiring prevailing wages to be paid, the contractor was bound to comply with an amendatory statute, which took effect while the work was in progress and which required the contractor to furnish affidavits showing compliance with the terms of the original statute. The Court of Claims decided that the amendatory statute did not impair the contractor's rights as fixed by his contract, but was merely a procedural provision designed to make effective the original statute.

Truck Weight-Tax Exemption

A statute which imposes weight-taxes on motor vehicles operated for hire does not require a state highway contractor to pay taxes on vehicles used solely in hauling materials for use in performing his contract, holds the Kentucky Court of Appeals in the case of *Webb's Transfer Line v. Commonwealth*, 137 S. W. 2d, 1096. But the statute does cover haulage contractors who merely haul materials for highway contractors, the court says.

Work Not an "Extra"

A trunk sewer contract required the contractor to dewater the trench in which monolithic construction was to be laid. The object, of course, was to permit proper setting of the concrete. The specifications contemplated the possibility of a wellpoint drainage system being used for the dewatering purpose. But that method proved ineffective, because of clay and subsurface water conditions. Those conditions were indicated by test holes referred to in the specifications. In the course of the work, it became necessary to construct subdrains to meet the requirement of the contract that "the contractor shall provide a method of draining the trenches that will secure a firm bottom for constructing the sewer."

The city engineer promised to pay the contractor additional compensation for installing the subdrains, but the city refused to back up the promise. The contractor sued, but the Washington Supreme Court ordered the suit dismissed. (*Queen City Construction Co. v. City of Seattle*, 99 Pac. 2d, 407.) The court decided that the only useful purpose served by

the subdrains was to enable the contractor to fulfill the above quoted requirement of the contract, and that the promise of the city engineer to pay extra compensation for work that was required in order that the original contract be performed was without consideration. The court said that the provision for contingent use of a wellpoint system of drainage, "if satisfactory wellpoint system is used," did not amount to a representation by the city that any wellpoint system would prove effective.

Subsoil Releases Contractor

A contractor bargained to construct a water supply tunnel for a city, on the faith of a plan furnished by the city, showing that "solid limestone" would be encountered. Work was commenced by sinking a shaft midway on the tunnel site. Instead of solid limestone, mud, boulders, clay and water constituted the "re-

ception committee." In the contractor's suit to rescind the contract, which he won, the United States Circuit Court of Appeals, Third Circuit, decided as follows (*City of Reading v. Rac*, 106 Fed. 2d, 458):

Use by the city of the term "solid limestone" on a boring drawing, on which the contract was based, constituted a fraudulent misrepresentation.

The evidence being conflicting as to whether the contractor could have discovered that the representation was false by using reasonable care before undertaking the job, the jury's finding in the negative settled that question in favor of the contractor.

One must rescind a contract with reasonable promptness after discovering the falsity of representations under which he has been induced to contract, but the contractor did not lose the right to rescind where he promptly complained to the city, although, pending an exploration of the site by engineers engaged by him, he told the city engineer that he would try to drive the tunnel after his sub-contractors had abandoned the job. In other words, the contractor had a right to proceed far enough to verify the true conditions existing underground without being deemed to have waived the right to rescind. In fact, his right to rescind was dependent upon his being able to prove that the subsoil conditions to be encountered were of the same character as the bad conditions which he had already encountered.

GRACE TWO-WAY ROAD SWEEPER



Also the
RAPID FIRE HEATER
for Tank Cars of Asphalt
DRAG BROOMS

Write for literature

W. E. GRACE MFG. CO.
5000 Holmes St.

Dallas

Texas

MODERNIZED POWER LUBRICATION

On The Job!



CHECK THESE FEATURES

Alemite Motor Oil Dispenser services crank cases direct from original drum.

Rigid drum supports prevent vibration or shifting when going over rough ground.

Alemite Low Pressure Barrel Pump services final drives and transmissions, direct from drum.

Air hose for inflating tires and air-cleaning.

Alemite Volume High Pressure Barrel Pump services all high pressure fittings direct from original drum.

Pays For Itself in Days!

BY providing better lubrication faster—by reducing "time out" for repairs due to faulty lubrication—by enabling you to move more yards of earth per day per machine—Alemite Portable Service Stations pay for themselves quickly, and return a handsome profit for years!

Here are some of the amazing results others are getting: Transmissions and

final drives filled at the rate of 14 lbs. per minute—tractor track roll bearings lubricated in seconds—all high pressure fittings dependably serviced in a hurry—direct from original drums! Motor oil is delivered to crank cases, also direct from the original drum. And there is ample air for inflation of tires and for air-cleaning.

This illustration shows the standard

model with Alemite Volume High Pressure Barrel Pump, Alemite Low Pressure Barrel Pump, Alemite Oil Dispenser, and the fourth reel for the air hose. However, the idea is flexible! You can have your own Alemite Portable Service Station made to your own special requirements! Alemite's experience is yours for the asking! Mail the coupon today for complete details!

STEWART-WARNER CORPORATION
1850 Diversey Parkway, Chicago, Ill. Dept. I
Rush complete facts and proof that Alemite Portable Service Stations pay for themselves in days!

Name.....
Address.....
City.....State.....
Firm Name.....



Ask Anyone
in Industry!

AVAILABLE UNDER
ALEMITE "Pay As You Save Plan"

ALEMITE

REG. U. S. PAT. OFF.

INDUSTRIAL LUBRICATION
ANOTHER STEWART-WARNER PRODUCT

Exhaust Analyzers— Should You Buy One?

The Limitations and the Possibilities of Savings Through Using an Exhaust Gas Analyzer Discussed

IF you're thinking of getting an exhaust gas analyzer for your shop, and begin to ask friends whether it is a worthwhile tool or not, you'll find almost every one has a different opinion. One operator will give an enthusiastic recommendation. Another foreman will look at you and say, "Exhaust analyzers? Phooey!"

If you talk to enough people, however, you'll find that those with the most experience say very definitely that a good analyzer, when used by a man who thoroughly understands how it works and what the limitations of it are, should reduce operating costs and maintenance costs.

C. E. Smith, Fleet Engineer, Ethyl Gasoline Corp., points out that any one who is disappointed in the results obtained with an analyzer probably expected too much of it. An exhaust gas analyzer does one thing, and *only one thing*. It measures the air-fuel ratio of an engine, how many pounds of air are taken into an engine for each pound of fuel. This ratio is extremely important in adjusting carburetors for best economy and power, and in doing accurate carburetor inspection work.

To get a clear picture of the economies possible with an analyzer it is important to understand how they operate, what they show, and what their limitations are. Gasoline goes through the carburetor of an engine and is mixed with 12 to 15 pounds of air for every pound of fuel. With involved laboratory apparatus, the actual amounts of fuel and air going into the carburetor can be measured, but this isn't practical in fleet work. A much simpler way is to analyze samples of the exhaust gases that come out of the tailpipe. These exhaust gases contain the products of combustion, water, Hydrogen (H_2), carbon dioxide (CO_2), and carbon monoxide (CO), plus oxygen (O_2) and other unchanged gases in air. Every time you change the air-fuel ratio, you get different amounts of CO_2 , CO and O_2 in the exhaust, so that by measuring these, you can tell what proportion of air and gasoline is going through the intake manifold into the cylinders.

Methods of Making Analysis

There are four common methods of making this analysis, all of which have been adapted to instruments which are

available to the vehicle operator or maintenance shop. They are:

(1) *Chemical Analysis*, by using Orsat apparatus with chemical solutions which absorb the various gases. This method is fundamentally accurate, but consistent results depend on the skill of the operator, and it does not give a continuous reading while carburetor adjustments are being made. However, it is the only accurate way known today of measuring air-fuel ratios above 15 to 1.

(2) *Hot Wire Catalysis*, based on the fact that certain materials, such as platinum, accelerate the rate of burning of combustible gases. An electrically heated platinum wire is used as one side of an electrical circuit known as a Wheatstone bridge and samples of ex-

haust gases and a measured amount of air are passed over it. As the temperature of the wire increases from the burning gases, electricity flows through it faster. This deflects a galvanometer, the face of which is marked in degrees of air-fuel ratio.

(3) *Relative Density Comparison* of air and exhaust gas, by comparing the weight. In this method, two paddle wheels are balanced so that exhaust gas can be blown against one, and air against the other. The difference in weight of the gases causes one wheel to turn more than the other, and thus move an indicator needle across an air-fuel ratio scale.

(4) *Thermal Conductivity* of exhaust gases. Again a Wheatstone bridge electrical circuit is used. This method measures the thermal conductivity, or heat-transfer properties, of the tailpipe gases as compared to the thermal conductivity of saturated air. Most air-fuel ratio analyzers on the market today work on this principle.

Exhaust gas analyzers built on the

principles of hot wire catalysis, relative density, or thermal conductivity are practical for shop work because they give a direct reading and a continuous reading during adjustments, and because they are portable and therefore suitable for use in road tests. But they do have the drawback of being inaccurate when the air-fuel ratio gets above 14.5 to 1, because somewhere near this point, depending on the engine being tested, the percentage of carbon dioxide in the exhaust gases reverses itself as the mixture becomes leaner. Determinations above 14.5 to 1 should be regarded as reliable only when they have been made by men experienced with a given instrument and engine, after a study of richer and leaner settings has been made to cross-check the readings.

Earlier it was stated that a mechanic should be thoroughly familiar with exhaust gas analyzers before he is assigned to use one. It is equally important for him to understand carburetion, not just in general but specifically the carbure-

(Concluded on page 33)

WALTER SNOW FIGHTERS make every winter an OPEN WINTER



It's always a hard winter and open for communities protected by Walter Snow FIGHTERS. Walter Snow FIGHTERS—found in no other type of truck—provide amazing traction on slippery surfaces and a tremendous power to battle through the heaviest snow drifts. Highway departments in localities where snow is heaviest point on Walter Snow Fighters for minimum protection against blizzard storms.

On account of the heavy snowdrift program, orders for snow removal equipment should be placed early. Send for literature.

WALTER MOTOR TRUCK CO.
1001-12 IRVING AVENUE, NEW YORK, N. Y.

PILE HAMMERS and EXTRACTORS HOISTS-DERRICKS WHIRLERS

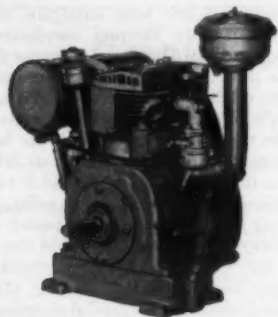
Special Equipment
Movable Bridge Machinery

Write for descriptive catalogs.

McKIERNAN-TERRY CORP.

19 Park Row, New York

Distributors in Principal Cities



One of the new Briggs & Stratton Model ZZ gasoline engines.

New Gasoline Engines

A new 4-cycle air-cooled gasoline motor, known as the Model ZZ, has just been announced by the Briggs & Stratton Corp., Milwaukee, Wis. Although rated at 6 hp, the actual hp output in the recommended speed range, as recorded in dynamometer tests, is 6.15 hp at 2,200 rpm, 7.20 hp at 2,700 rpm, and 7.70 hp at 3,200 rpm, according to the manufacturer. This engine, which has a 3 x 3 1/4-inch bore and stroke, is recommended for pumps, hoists, generators, mixers, and similar work on construction and maintenance jobs.

Ignition is supplied by a specially designed dust and moisture-proof high-tension flywheel magneto. Other standard equipment includes a silchrome exhaust valve with alloy steel inserted seat; inserted molybdenum alloy valve guides; specially designed float-feed-type carburetor; adjustable mechanical governor; drop-forged counterweighted crankshaft; aluminum alloy pistons and connecting rods; pump and splash lubricating system; gasoline filter; oil-bath air cleaner; and screened blower housing. The fuel tank capacity is 1 1/4 gallons and the oil reservoir, 5 pints.

The Model ZZ is also available with the following equipment features identified as models: Model ZZL, a light-weight type secured by making the base, crankcase, blower housing, etc., of cast aluminum instead of cast iron; Model ZZR-6 with 6 to 1 gear reduction drive; Model ZZR with direct-mounting crankcase, machine faced and tapped for direct assembly of the driven unit.

Detailed specifications on these new gasoline engines and their applications may be secured direct from the manufacturer by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

PALMER Friction Materials

for every kind of braking



On your trucks, cranes, hoists, power shovels, etc.

PALMER Friction Blocks and Industrial Brake Linings will give you the utmost in service. We invite you to make comparative tests. Information on request.

27 years' experience in producing the best in brake and friction products.

PALMER
Asbestos & Rubber Corp.
180 N. Michigan Ave., Chicago, Ill.

Button Reflectors On Penn. Turnpike

A contract was recently awarded to Western Cataphote Corp. of Toledo, Ohio, for furnishing and installing various types of reflector units in the center strip and along the shoulders of the new 160-mile Pennsylvania Turnpike between Harrisburg and Pittsburgh. This direct contract for approximately \$66,000 includes NiteWay Outliners for the center strip.

These are two-way reflector units visible at night to traffic coming from either direction. In addition, similar one-way Outliners are being furnished for the two outside shoulders placed 10 feet from the edge of the pavement. Additional non-reflecting center mushrooms are included in the contract for dividing traffic in the tunnels. In addition, there are 2,400 structure markers to be placed at the end of guard-rail installations, culverts and bridges.

All of the reflectors are standard Cataphote reflector buttons 7/8-inch in diam-

eter, arranged six to each single Outliner and twelve for double Outliners. The installation of the NiteWay Outliners was subcontracted to Ray McCarty of Kaukauna, Wis., who is working out of Bedford, Pa. The installation began August 1, 1940, and will be completed by October 1.

Road Maintenance Outfits

A new bulletin of special interest to state, county and township highway engineers and maintenance men has recently been issued by the Caterpillar Tractor Co., Peoria, Ill., describing and illustrating the use of Caterpillar diesel motor graders for year-round maintenance work. These graders are shown at work on maintenance of dirt roads, snow plowing, bank work, and heavy ditching, as well as doubling up with a pulled grader to increase the mileage maintained in one day.

Copies of this Bulletin D-011 may be secured by those interested direct from the manufacturer or from this magazine.

Surface Consolidation Of Low-Cost Highways

Solvay Sales Corp., 40 Rector St., New York City, has recently issued a new bulletin entitled, "Calcium Chloride Surface Consolidated Roads—Methods, Materials and Equipment for Construction and Maintenance." This booklet, which is largely based on engineering and field reports covering roads now in service, gives the economics and advantages of surface consolidation, the non-technical, rule-of-thumb method of stabilizing low-cost roads, and contains detailed recommendations for both construction and maintenance. Description of roads suitable for surface consolidation, costs and savings, materials and equipment required, use of calcium chloride and why it is required, and information on crown and drainage are also included.

Copies of this bulletin may be obtained by those interested direct from Solvay Sales Corp.

TWINBATCH STABILITY

**Koehring 34-E
Twinbatch Paver**

STABILITY FOR SHOULDER TO SLAB POURING...

Koehring Paver stability assures "non-tip" pouring from shoulder to slab. Widely spaced crawlers with extra wide crawler shoes provide the required stability and low ground pressure. Boom may be turned to almost 90° angle and carry the loaded bucket to the end...for wide distribution of concrete...without tipping paver. Crawler girders are high strength steel, with heavy truss plate, to provide necessary support for the paver when operating under unusual conditions. If your paving job requires shoulder to slab pouring, use a Koehring Paver.

KOEHRING CO., Milwaukee, Wis.

HEAVY-DUTY CONSTRUCTION EQUIPMENT

Going Up! Navigation Requires Raising Span

(Continued from page 1)

All the steel was laid back on the two shore sections of the cantilever spans, the weight helping to balance the two river sections hanging over the water. The weight of the steel was supplemented by about 125 tons of gravel and rock in large boxes built on the shore ends.

This left the two cantilever sections resting on their shoes on the two main piers and the two abutment piers. Around each main pier a heavy timber working platform was suspended from the bridge section by heavy rods. These platforms moved up with the bridge and also carried the pier concreting forms with them as the work progressed upward.

Lifting Procedure

Four 500-ton capacity Bethlehem Steel Co. hydraulic jacks operated by Watson-Stillman electric pumps were used for the main pier and two 200-ton jacks for the anchor pier, one cantilever section being lifted at a time. The section rested on its shoes, two on the main pier and two on the anchor pier. The jack boxes were set on the main pier under the lifting beam and adjacent to each of the shoes. The two lighter jacks on the anchor pier were set outside of the two shoes. The jacking was then started and as the shoes were raised, they were shimmed up with 3/16-inch shims inserted underneath. In the early stages of the lifting, brute strength was applied by a crew of men operating six hand-powered hydraulic pumps. Later the electric pumps were installed.

When the limit of the jacks was reached, lengths of I-beam grillage were substituted for the shims. Then the bridge section was allowed to rest on the shoe grillage while the jacks were taken out and reset on top of another set of grillage. During the raising operation, shims were also inserted between the jack boxes and the bearing surface as rapidly as they would go in. The jack grillage consisted of 6-inch I-beams for the anchor piers and 12-inch beams for the main piers.

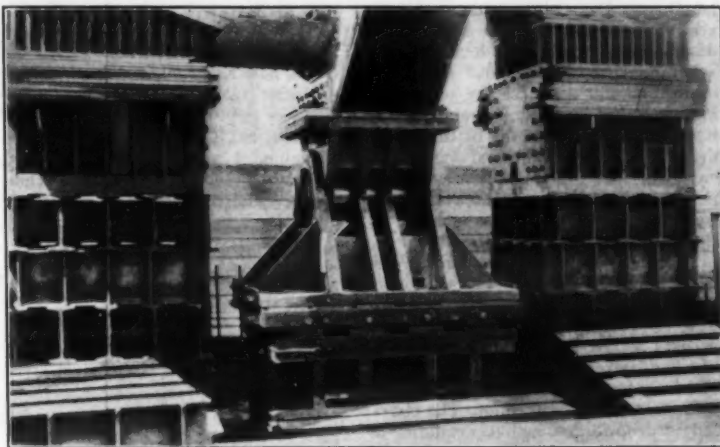
This jacking process was repeated until the bridge section had been lifted 7 feet. To avoid any possibility of impact, springs were placed between the jacks and the bearing surface, consisting of strips of high-quality steel having several waves or convolutions in their length. As the pressure increased, these waves tended to flatten out.

This was a precision job. The grillage I-beams were milled to a tolerance of 8/1,000 inch. Gages at each end of the floor beams indicated any variation from level crosswise. The shims were all exactly the same thickness and were counted as they were inserted at all points. This constituted a check on the level at both ends. Men at each pier, watching these shims, were in constant touch with each other by telephone.

Having raised the level 7 feet, the section was brought to rest on the shoes, and the jacks and their grillage removed. Reinforcing steel was then placed in position, forms adjusted, and the concrete poured, the grillages under the shoes being embedded in the concrete. High early-strength cement was used, giving 3,000 pounds compressive strength in 72 hours.

The work schedule ran something like this: Monday, raise the span 7 feet; Tuesday, construct the forms for the concrete to build up the pier; Wednesday, place the reinforcing steel; and Thursday, pour the concrete. Then the crew ferried across the river and went through the same routine with the opposite span.

Thus the contractor raised each sec-



One of the main pier bridge shoes in the center, resting on shims. At the top on each side are two adjacent jack boxes resting on grillage. A pile of jack box shims is carried handy on brackets.

tion of the bridge about 7 feet each week for a period of about six weeks. The shore ends of the span were then tilted slightly to provide a 2 per cent down-grade, raising the river ends. The center suspension span was put back into place, piece by piece, and is slightly longer than before. The whole process required about three months.

Meanwhile the new streamlined approaches, constructed of concrete, steel and looping roadways, were completed on both the Washington and Oregon ends, and the bridge was ready for traffic on July 15.

Protection From Wind

Gales of wind frequently blow through Columbia Gorge. To prevent any lateral movement during the lifting

operation, vertical wind beams, consisting of 120-pound 24-inch I-beams, were used, placed between the shoes and adjacent to the floor beams. Channels were then welded to the floor beams close against the wind beams, but so that the latter could slide between them as the section went up. This arrangement guarded against any lateral movement of the section.

Materials and Personnel

In the course of the work, 980,000 pounds of jacking steel was required and was furnished by the Schmidt Steel Co. of Portland. About 300 tons of new steel, furnished by the Willamette Iron & Steel Co., was required for the approach spans, and about 250 tons of reinforcing steel was used, furnished by

the Mercer Steel Co. of Portland.

For the Tavares Construction Co., Lee Gordon was Superintendent and Carlos J. Tavares was on the job most of the time. Charles G. Huber was Consulting engineer and prepared the plans and specifications. S. B. Edwards was Resident Engineer for the Wauna Toll Bridge Co. and Newton Clark was Inspector for the U. S. Engineer Department.

Arc Welding Chart

According to the Lincoln Electric Co., Cleveland, Ohio, there is now available an arc welding electrode for welding practically every conceivable job. A chart recently issued by this company in attractive design and color gives uses, physical characteristics, etc., as well as currents and procedures for some thirty-six different electrodes. It may be obtained by writing direct to the Lincoln Electric Co. on your business letterhead and mentioning CONTRACTORS AND ENGINEERS MONTHLY.



IN FIGHTING *Snow* EXPECT AND PLAN FOR THE WORST

That involves the provision of enough mechanized snow removal units to really do a thorough job. It means the choice of plows which, along with correct design, have the greatest possible strength with the lowest possible weight.

AMERICAN SNOW PLOWS

Fill those requirements to perfection. They have been tested and have proved their superiority where snow is SNOW; in Montana, the Dakotas, and the states around the Great Lakes.

Before you buy any plows for the coming winter write for a copy of our new catalog of Snow Plows and Wings (SNP-S).

AMERICAN HOIST & DERRICK CO.

NEW YORK SAINT PAUL MINN CHICAGO

AMERICAN TERRY DERRICK CO.
EIGHT HUNTER, N. Y.

Ask for a copy of
"WITH AN EYE
TO SAFETY"

for safe WIRE ROPE
FASTENINGS
genuine CROSBY CLIP



Heltzel Superior Heavy-Duty Road Forms have established a new low cost . . .

1. By building more miles of concrete slab.
2. By elimination of expensive upkeep and repairs.

. . . and because Heltzel forms are easier to set and strip — form setting costs are reduced to a minimum. Write for complete information and descriptive literature. Catalog S-19.

Heltzel
BUILDS IT BETTER

BINS, Portable and Stationary
CEMENT BINS, Portable and Stationary
CENTRAL MIXING PLANTS
BATCHERS (for batch trucks or truck mixers with automatic dial or beam scale)
BITUMINOUS PAVING FORMS
ROAD FORMS (with lip curb and integral curb attachments)
CURB FORMS
CURB AND GUTTER FORMS
SIDEWALK FORMS
SEWER AND TUNNEL FORMS
CONCRETE BUCKETS
SUBGRADE TESTERS
SUBGRADE PLANERS
TOOL BOXES
FINISHING TOOLS FOR CONCRETE ROADS

HELTZEL STEEL FORM & IRON CO.
WARREN, OHIO • U. S. A.



A new portable earth-drill outfit.

A New Earth Auger

A new machine for soil exploration and foundation work was recently made by the Concrete Transport Mixer Co., 650 Rosedale Ave., St. Louis, Mo., to the specifications of the Wabash Stone Co. for use in its work in the St. Louis area. Much of this company's work consists of drilling through filled ground into hard natural soil for footing piers, and frequently encounters large rocks, logs and debris of every kind. The earth auger built to its specifications succeeded in overcoming these obstacles, it is reported, and with some minor changes, this machine has now been placed on the market.

The unit is completely portable and requires a crew of only two men. About 15 minutes is required to set up the unit for work after arrival on the job and the same time is required to prepare for moving to another job. When the surface of the ground is reasonably level or smooth, the machine travels erect from one boring to the next, but in traveling from job to job, the mast is lowered, thus requiring a clearance of only 9 feet during transportation.

In operating this earth auger, the drill bit is centered over the desired location and lowered to the ground. Rotation is started and the bit is forced into the soil by the crowding cable. When the bit is full, rotation is stopped and the bit is raised to the surface where very rapid rotation is started, causing the soil to be thrown from the bit by centrifugal force. These operations are repeated until the desired depth is reached. It is reported that a good operator can drill 21 feet in 10 minutes. The holes may be 10, 12, 16, 18, 30 or 36 inches in diameter and any depth up to 21 feet.

Power is furnished by the engine of the truck on which the unit is mounted, through a roller-bearing power take-off. The hoist is a two-four shoe toggle-throw clutches coupled tandem unit, and the hoisting and crowd cables are 7/16-inch preformed wire rope. Accessory equipment carried by the rig includes a complete set of drill bits, bars for loosening boulders, tongs, and other small tools.

Further information on this earth auger for use in test borings, soil exploration and similar work may be secured direct from the manufacturer by mentioning this item, or from this magazine.

New Sinker Drill

A new sinker, known as the S-73, has recently been announced by the Gardner-Denver Co., Quincy, Ill., to fill the

need for a drill in a size between the 55-pound type and the heavier units weighing 75 to 80 pounds. According to the manufacturer, severe tests have indicated that this new 67-pound sinker has the speed and power of the larger drills without the additional weight and has the same air consumption as the 55-pound drill. It is recommended for general drilling in quarries, on construction jobs, and in shaft sinking.

The four-pawl rotation feature of the other Gardner-Denver drills is incorporated in the S-73. The pawls are reversible for double wear. The valve design permits unrestricted admission of air with an extremely short valve stroke. The drop-forged cylinder has a bushing with renewable bronze liner. The chuck end is drop-forged and is available in any style. A large oil reservoir surrounds the cylinder bushing and feeds oil automatically to all working parts of the drill. This sinker has 3/4-inch side rods of special stock, with long cap nuts to protect the thread.

New Crushing Principle Feature of Rock Crushers

The new Kue-Ken crushing principle, the main feature of Kue-Ken crushers made by the Straub Mfg. Co., Inc., 507 Chestnut St., Oakland, Calif., is a pair of balanced pendulum-type jaws moving toward each other in unison, producing crushing without rubbing. In addition Kue-Ken crushers have all the

mechanism running in a filtered and positively sealed oil bath.

Available in three sizes, with feed openings of 6 x 12-inch, 8 x 16-inch, and 10 x 24-inch, these Kue-Ken crushers are described and illustrated in action in Bulletin No. 39, copies of which may be secured by contractors and state and county highway departments direct from the manufacturer by mentioning this item, or from this magazine.



EXPANSION JOINT



CONTRACTION JOINT

Translode Angle-Unit With Continuous Base (For Expansion and Contraction Joints)

The Translode Angle-Unit is the answer to the engineer's and contractor's problem because:

It is a complete joint ready to be placed on the sub-grade.

It eliminates the dowel bar alignment problem.

Its rigidity and lightness in weight enables the complete joint to be carried by one man.

It is an ideal load transfer device for use in concrete runways of Airports.

For Further Details Write

HIGHWAY STEEL PRODUCTS COMPANY
Chicago Heights, Ill. Birmingham, Ala.

The Boss Says:

**"OPERATION COSTS ARE
LOWER THESE
DAYS"**



...and one reason
for lower cost per ton mile
is improved gasoline

WHEN you consider the amazing improvements that have been made in truck engines during the past ten years, don't overlook the improvements in gasoline that have made many of them possible. For example, the steady rise in anti-knock quality has permitted a parallel rise in compression ratios with a resulting increase in performance and efficiency.

And within the past few months further gains in economy have been made possible by a sharp rise in anti-knock levels. Oil refiners are offering better gasoline—but it is up to the truck operator to convert this improvement into smaller costs per ton mile, more uniform schedules and more flexible performance.

Since improving gasoline is only half the story, the Ethyl laboratories not only cooperate with refiners, but also help engine manufacturers and fleet operators to realize the greatest possible benefits from improved fuel.

Extensive road tests and the practical experience of fleet engineers have shown that there are three ways in which full advantage can be taken of better gasoline:

1. In older vehicles by installing high compression pistons or cylinder heads (as supplied by the manufacturer) when engines are overhauled or rebuilt.
2. In present vehicles which have high compression engines, by advancing the spark as far toward maximum efficiency as the improved gasolines will permit.
3. In purchasing new equipment by investigating the compression ratios available and specifying a ratio high enough to take full advantage of modern gasoline.

Ethyl Gasoline Corporation, Chrysler Building, New York, N. Y., manufacturer of anti-knock fuels used by oil companies to improve gasoline.



"MOTHER-IN-LAW" SEAT. In order to make accurate observation of the performance of some new and improved fuels in certain commercial vehicles, it was necessary for the observer to ride in the specially designed "mother-in-law" seat, illustrated above.



LABORATORY AND ROAD TEST work is correlated to improve commercial vehicle operation. The engine pictured here in the Ethyl engineering laboratory is the same make as that used in the bus shown above.

**Contractors—Prevent
loss of tools and other
equipment with this
EVERHOT
Branding
Iron**

This inexpensive Branding Iron may also be used as a soldering iron or blow torch.

EVERHOT MFG. CO.
51 E. 15th St.
MAYWOOD, ILLINOIS

MAKE BETTER USE OF TODAY'S BETTER GASOLINE!

Sod-Cutting Machine Speeds Roadside Job

**Slopes Flattened, Sodded
And Planted to Prevent
Erosion and Improve the
Appearance of Miss. Road**

(Photos on page 4)

THE contract for a roadside-development project on State Highway 6 in Lafayette County, Mississippi, including excavation to flatten slopes, sodding, mulching and planting, and some rubble masonry work, was awarded to Winston & Griffith of Dallas, Texas, for \$24,782. Work started on June 12, 1939 and was completed on September 2, 1939, with the exception of the tree planting which was done later in December, in the planting season.

Quantities Involved

Among the major items called for in the contract were the following:

Clearing and grubbing.....	16,000 cu. yds.
Unclassified excavation.....	1,500 cu. yds.
Top soil.....	31,000 sq. yds.
Regular sodding.....	47,000 sq. yds.
Solid sodding.....	20,500 sq. yds.
Mulching.....	100 cu. yds.
Rubble masonry.....	4,000 lin. ft.
Wooden guard rail (rustic type).....	23 cu. yds.
Class B culvert concrete.....	

Preliminary Work

The preliminary work included the necessary clearing and grubbing, and the extension of structures. Nearly all of the pipe line on the project was extended in order to hold the widened slopes on the fill sections, but it was necessary to widen only one culvert, which is of special design with one of the downstream wings acting as a retaining wall. The concrete work on the project included the construction of six pipe-culvert headwalls, two reinforced-concrete culvert headwalls, and two extensions of drop inlets. This work was completed before excavation was started.

Dirt Moving

Since there was a comparatively small amount of dirt to be moved, it was handled with a dragline, a Caterpillar Twenty and bulldozer, and a grader. All of the cut sections were widened to the standard section, most of the fill section ditches were laid back from the toe of the fills, and the ditches where the cuts and fills join were either flared back or terraced around the hills on an easy grade in order to eliminate as nearly as possible future erosion.

The slopes on all of the fill sections were increased as much as possible, with none less than 2:1 and most of them ranging from 3:1 to 8:1. In a number of cases, the highway was made into a boulevard section on the right side of the road, with slopes approximately 8:1. This was accomplished by hauling in fill dirt and removing small hills occurring in this section. Extreme care was taken in removing unsightly knots of dirt and in arranging the fill dirt in order to give the best drainage conditions and to improve the appearance of the roadside.

The regular procedure was for the dragline to lay back the cut sections,

with the bulldozer spreading and smoothing the dirt placed in the fill sections. The tractor-bulldozer outfit also moved dirt where its final destination was close by and proved useful in removing knots of dirt and straightening up cut sections behind the dragline. Fresnoes and laborers followed, handling the final finishing and cutting the small ditches.

During the course of dirt-moving operations, good top soil was stocked and saved and certain sections of good soil were left in place until they could be used later.

Sodding

Immediately after finishing and dressing a portion of the job, the regular and solid sodding were begun. All cut slopes

and ditches on the project were solid sodded, as was the inside shoulder of a 2,640-foot horizontal 2-degree 30-minute curve on the project. On the fill shoulders, a 2-foot strip of solid sod was placed in order to protect the breaking point of the shoulder. This sod began 4 feet from the slab and ended 6 feet from the slab. The solid sod in the cut sections extended to within 4 feet of the slab edge. The remainder of the shoulder was sodded with plain sod.

All fill slopes were plain sodded, with top soil spread over them to a depth of from 2 to 4 inches, followed by seeding with 30 pounds of Italian rye to the acre. The slopes were then mulched with 1 inch of oat straw. On the fill sections where erosion was probable, those areas were solid sodded, as around headwalls. All other flat exposed areas on the project were plain sodded, topsoiled and seeded.

The sod, consisting of Bermuda and carpet grass, was located in pastures and fields near the project where it was cut in 12-inch square blocks about 3

inches thick by a sod-cutting machine developed and patented by the firm of Winston & Griffith, contractor for this project. The Caterpillar Twenty was used to pull this machine. The sod was stacked in even rows on long-wheelbase trucks and hauled to the job where it was unloaded and placed on the area to be sodded by crews of unskilled labor.

On the 2:1 slopes each block of sod was pegged in place with oak pegs 12 inches in length. After the fills were covered with rich top soil, regular sod was planted, 4-inch square blocks of sod being placed 12 inches apart, after which the Italian rye grass seed was sown, and the entire area covered with oat straw mulch.

About 216 dogwood trees and 73 red bud trees were later planted in the boulevard sections on each side of the highway throughout the project.

Masonry and Guard Rail

The rubble masonry consisted of broken stones obtained in the vicinity (Concluded on page 43)

NEW YORK WORLD'S FAIR
'FRISCO WORLD'S FAIR
LA GUARDIA FIELD
(NORTH BEACH AIRPORT)
LANGLEY FIELD
NORFOLK NAVAL BASE
AIRPORTS IN ENGLAND
(LOCATIONS CENSORED)
CHAIN O'ROCKS BRIDGE
(ACROSS THE MISSISSIPPI)
U. S. LEVEE & REVETMENT
WORK NEAR NEW ORLEANS
OLD SPANISH TRAIL
LINCOLN MEMORIAL DRIVE
MILWAUKEE
ARLINGTON CEMETERY
SKYLINE DRIVE
VIRGINIA
YOSEMITE PARK
SKANDAN ROAD

The
Barber-Greene
 TAMPING-LEVELING
FINISHER
was used on these
JOBS →

For quality, permanence and economy,
 they choose the Barber-Greene.
 Send a card for the B-G
 Finisher Booklet.

BARBER-GREENE
AURORA ILLINOIS

COMPLETE
WELL POINT SYSTEMS
WILL DRY UP ANY
EXCAVATION

Faster—More Economically

Write for Job Estimate and Literature

COMPLETE
MACHINERY & EQUIPMENT CO., Inc.
 Dept. C

38-40 11th St., Long Island City, N.Y.
 Tel. IRonsides 8-8800

Mississippi Reports On State of Its Roads

An unusually attractive pictorial review of the achievements of the Mississippi State Highway Department and the progress made in its highway system has been issued as a supplemental report of the Department for the years 1936-1939.

This 152-page book is replete with photographs, showing progress pictures in the evolution of bridges over Mississippi's streams, the elimination of dangerous grade crossings, many scenes along the various state highways, pictures of construction and maintenance under way, how drainage problems have been handled, scenes in its roadside development program, as well as views of the various offices of the department and the personnel.

This very fine volume depicting and describing the accomplishments made in Mississippi serves not only as an introduction to the men and women comprising the department personnel and who are responsible for its work but also serves as an excellent portrayal to all citizens of the state of what has been done with the money set aside for highway improvement.

While this Pictorial Review is not for general distribution, interested state highway engineers in other states may secure a copy by writing direct to Mr. E. D. Kenna, Director, Mississippi State Highway Department, Jackson, Miss.

Steam Pile Hammers And Pile Extractors

A new circular has recently been issued by Vulcan Iron Works, Inc., 327 N. Bell Ave., Chicago, Ill., describing and illustrating its open-type, closed-type and single-acting type pile hammers and pile extractors. The open-type Super-Vulcan pile hammer has the same characteristics as the Warrington-Vulcan single-acting pile hammer, except that the former delivers twice the number of blows per minute, consumes from 25 to 35 per cent less steam and drives more piles per dollar. The single-acting type operates at a medium steam pressure and delivers a moderate frequency of low velocity blows from a relatively heavy ram.

The closed-type hammer possesses the same characteristics as the single-acting pile hammer with the following additional features; it delivers twice the number of blows per minute, working parts are totally enclosed to permit under-water work, the overall length is reduced to save head-room and it consumes 25 to 35 per cent less steam. The Vulcan pile extractor, according to the manufacturer, is a compact and inexpensive machine expressly designed for pulling sheet steel, wood, concrete, H-beam and pipe piles.

Specifications for the pile extractor and the three hammers are included in this bulletin, No. 84-2140, copies of which may be obtained direct from the manufacturer by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

Civil Engineering Handbook

The second and revised edition of "Civil Engineering Handbook," edited by Leonard Church Urquhart, C. E., Professor of Structural Engineering at Cornell University, has recently been published by the McGraw-Hill Book Co. Since 1934, when the book was first published, major changes have been made in some portions of most steel and concrete specifications, and many developments have taken place in other fields. This second edition includes the latest material in order to bring the text into conformance with present practice.

This Handbook aims to fulfill a two-fold purpose: first, to present in one

volume the fundamentals of the various subdivisions of civil engineering in order to serve as a ready reference volume for practicing engineers and contractors in the field; and second, as a textbook in undergraduate courses in civil engineering. Edited by Professor Urquhart, the volume is made up of various sections each prepared by a specialist on that subject and includes such general sections as surveying, railway and highway engineering, mechanics of materials, hydraulics, stresses in framed structures,

steel design, concrete, foundations, sewerage and sewage disposal; and water supply and purification.

Copies of this second edition of Civil Engineering Handbook may be secured direct from this magazine. Price: \$5.00.

Rock Drill Accessories

Stressing the proverb, "A chain is no stronger than its weakest link," a new 12-page booklet recently issued by the Ingersoll-Rand Co., 11 Broadway, New

York City, illustrates and furnishes data on the many rock drill accessories necessary to efficient rock drilling. These include such items as hose and couplings, air filters, grinders, steel cutters, airline lubricators and rock drill mountings,moil points, chisels and spades for breaking concrete, cutting asphalt, tamping and digging.

Copies of this booklet, Form 2410, may be obtained by writing direct to the manufacturer and mentioning this magazine.

MARION FEAT

ARE BASED ON YOUR MATERIAL HANDLING

Whether that job calls for a shovel, dragline, clamshell, crane or pull-shovel... whether the material to be handled at a profit is rock, shale, clay or dirt... Marion machines are designed and built to meet each situation with speed and economy. MARION features provide every contractor-user and

quarry operator with a well known low maintenance, profitable machine. Watch a MARION in action; it travels... check its performance and yardage records. This convinces you your next machine should be a MARION.

THE MARION STEAM SHovel
MARION, OHIO, U.S.A.

MARION

SHOVELS • DRAGLINES • CLAMSHELLS CRANES • PULL-SHOVELS • WALKERS



Diesel Replacements For Chevrolet Trucks

Announcement has been made by the Hercules Motors Corp., Canton, Ohio, that a Power Package Hercules diesel replacement unit has been engineered for 1940 and 1941 conventional and cab-over-engine Chevrolet trucks.

The basic design for the Chevrolet Power Package engine is the Hercules Model DODD 4 1/4 x 4 1/2-inch diesel which has already been proved in auto-

motive service and in many other types of industrial application. Installation of this unit in a Chevrolet truck chassis is quickly accomplished by any good mechanic with a helper. No major changes in the chassis are necessary. The engine is started with the same button used for starting the gasoline engine regularly furnished in Chevrolet trucks. Speed is controlled by a foot accelerator and the engine is stopped by a slight pull on a conveniently placed handle on the dash.

Crushing Equipment

The complete line of Gruendler crushing, screening and pulverizing equipment, as well as bucket elevators, quarry cars and hoists, and heavy-duty belt conveyors, is described and illustrated in a new catalog recently issued by the Gruendler Crusher & Pulverizer Co., St. Louis, Mo.

The crushers include trailer-type jaw crushers, windrow portable and tractor types, crushers with power unit and belt

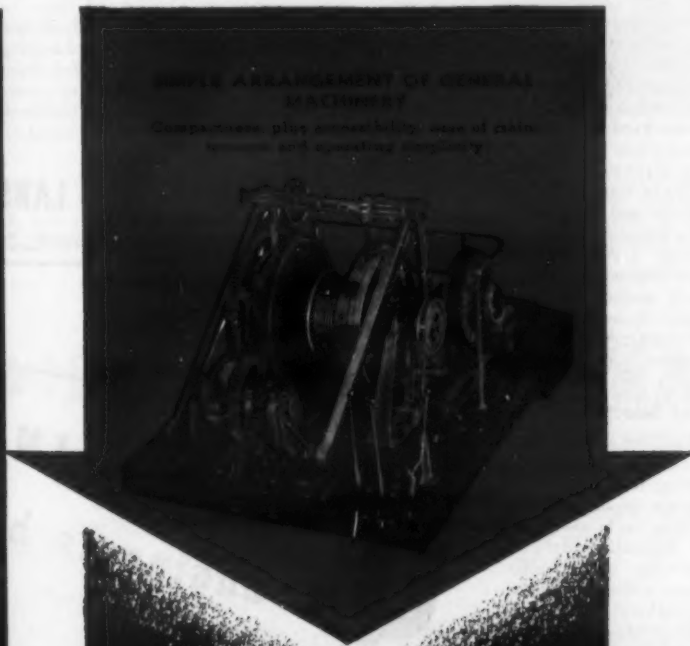
delivery conveyors, double roll crushers and two-in-one portable hammer crushers, comprising a wide variety of sizes and types to meet all conditions. Specifications are given for all of this equipment and there are many diagrams showing construction features, and action photos.

Copies of this catalog No. 600 may be secured by interested contractors and state and county highway engineers direct from the manufacturer by mentioning this magazine.

FEATURES

PRESENT DAY NEEDS . . .

MODERNIZE
with MARIONS



HORIZONTAL PROPELLING SHAFT includes the multiple jaw clutches for distributing the power to the engine, and the variable speed clutch which locks the machine against slipping clutches.



AND TURNING - FAST TRAVEL

Cost-Plus Contracts For War Dept. Work

Contractors Selected on Basis of Responsibility and Achievements; Warning Issued Against Those Who Claim to Have "Influence"

† IN order to clear up misunderstandings in regard to cost-plus-a-fixed-fee contracts, the Office of the Quartermaster General of the War Department has issued the following statement.

The general practice is to contract on the basis of the lowest bid received in public competition and the use of the so-called "cost-plus-a-fixed-fee" type of contract is the exception to the rule. However, when it is in the public interest to begin work without waiting for the development of design and plans to the extent necessary if a lump-sum proposal is to be intelligently formulated, the cost-plus-a-fixed-fee contract provides a form of agreement under which the work can be started at once, and the successive steps of construction can proceed as the successive steps of design are developed.

Method of Selection

A cost-plus-a-fixed-fee contract is awarded as the result of negotiation with a selected contracting firm. For some time a special group in the Quartermaster General's Office has been and still is collecting and compiling data on contracting, engineering and architectural firms which are willing to participate in the current national defense program. An analysis of these data provides ready information on the organizational, plant and financial resources of these firms, the nature and scope of their past achievements, etc., all of which is essential in measuring the qualifications and capabilities of the prospective contractors.

When authority is given for a certain project under this type of contract, a study is made of the above-mentioned data, and there is selected therefrom the firm which appears to be best qualified to undertake and satisfactorily complete the contemplated work. This selected prospective contractor is then invited into negotiation and when these negotiations have reached a point where the Government and the contracting firm are agreed as to what is to be done and the fee to be paid therefor, the name of the firm and the agreed-upon fee are submitted to the Advisory Commission to the National Defense Council for clearance. If cleared, the terms and conditions are translated into a formal contract which, when signed by both parties, is presented to the Assistant Secretary of War for his approval. Work is commenced promptly after approval to the contract.

How to Register

The War Department will give consideration to all qualified contractors, engineers and architects interested in the defense construction program and will furnish, upon request, a detailed outline of information required for qualification. Those who so desire may personally present their credentials to the Office of the Quartermaster General. However, it is not considered advisable or necessary that they remain in Washington with resultant loss of time and expense, or return for further consultation until called in by the War Department for negotiations in connection with some particular project.

The formation of organizations to handle work not normally performed is discouraged. Each project represents the coordinated work of specialists in generally recognized fields. It is therefore desired to select an organization (either one or a combination of firms) which normally executes the most im-

portant phases of work with its own forces. It is contemplated that other phases generally executed on a so-called subcontract arrangement will be handled either on a cost-plus-a-fixed-fee or a lump-sum basis, according to the interest of the Government.

To date approximately 1,900 firms have filed their experience records and evidenced interest in the probable eighty projects to be awarded on negotiated fixed-fee basis. Under these conditions it is obvious that all qualified firms will not be able to secure work.

Warning Against "Influence"

It has come to the attention of the War Department that certain individuals are alleging that they have influence and are able to assist interested contractors and engineering and architectural firms in securing contracts awarded by the Quartermaster Corps. These statements of alleged influence are without foundation, the Quartermaster General states most emphatically, as firms will be selected solely on the basis of their experi-

ence and qualifications and ability to render service of value to the Government in connection with any particular project. Awards of negotiated fixed-fee contracts are primarily based upon the interests of the Government after due consideration of the relative experience and merit of the selected contractor. Final decision respecting relative qualifications is determined in the Office of the Quartermaster General.

Unless a deviation therefrom presents a special advantage to the War Department, it is the policy to make awards to qualified firms in the geographical area in which the work is to be performed. All things being equal, the awards will be spread out as much as possible; an award of more than one contract to any one firm is not contemplated unless the interest of the Government dictates a necessity for such action.

The F-4 $\frac{1}{2}$ Barrow is built for easy loading or dumping, correct width for hoists, deep tray for wet concrete or mortar, Never-slip axle 16" wheel with ball bearings.

LANSING COMPANY

LANSING, MICHIGAN
Chicago New York Philadelphia Kansas City
San Francisco Boston Minneapolis



F-4 $\frac{1}{2}$ Barrow—Pneumatic Tire

Better Construction Profits

Q. How do INGERSOLL-RAND
Engineers build in Reliability?
A. THEIR New 60 cfm Two-Stage Portable
COMPRESSOR IS WAUKESHA POWERED

● In this new Lightweight Portable, the Waukesha Engine and the compressor are joined in a single, unified assembly having the strength and rigidity necessary for permanent alignment and trouble-free operation.

Waukesha Engine design secures smooth operation by combining structural rigidity with nicely-balanced moving elements.

All the advantages of multi-cylinder power—quicker acceleration, clean combustion, cool valves—and fuel economy with more power—are built into this small-size, four-cylinder engine. That's why it's so widely used in mixers, pumps and other types of general industrial machinery. It will be well worth your while to know more about this engine—get Bulletin 827.



Two-Stage Air-Cooled "Push-About" Model D-60, 60 cfm, 100-lb. pressure (left) and Deluxe unit (right).

WAUKESHA

WAUKESHA MOTOR COMPANY, WAUKESHA, WISCONSIN, New York, Tulsa, Los Angeles

ENGINES



This sand and gravel dredge was re-conditioned by cutting out old corroded plates and installing new ones with a Westinghouse arc welding set.

Arc Welding Saves Cost of New Dredge

A large sand and gravel company recently saved the purchase price of a new dredge by the use of arc welding in re-conditioning hull plates which had been badly corroded by the action of sea air and salt water. The water-line plates of this 141-foot long dredge, after many years of service, had been eaten away so badly that it was necessary to make extensive repairs to the hull or to buy a new dredge.

It was decided to attempt the replacement of the corroded plates by use of electric arc welding. The old plates all around the hull were removed and new sections were welded in their place. The supporting triangle sections for the side runways were cut from the old plates and suspended by temporary braces. The old plates were then cut out, and the new ones, each about 10 feet long x 27 inches wide, were welded into place, using Westinghouse arc welders. A butt weld reinforced with a 3 x 5/16-inch strap was used to join the bottom of the new section to the top of the old. At the top, the new plates were welded to the steel deck plates.

It is estimated that 2,800 feet of welds were made and that close to 1,600 pounds of 5/32 and 3/16-inch welding rods were consumed.

We shall appreciate your mentioning CONTRACTORS AND ENGINEERS MONTHLY when writing to advertisers.

Why Experiment?



When you know ROSS plows will solve all your snow removal problems. The only plows with the "Sno-Flo" moldboards. They will move more snow with less power.

There are ROSS plows and wings for every truck and tractor.

Write for Catalog

Manufactured by
The BURCH CORPORATION
Crestline, Ohio.

EQUIPMENT BUILDERS FOR FIFTY YEARS

Two Diesel Engines Power Big Dragline

A new development in walking draglines has recently been announced by the Page Engineering Co., Clearing Post Office, Chicago, Ill. The new Page walker is equipped with two diesel engines, one for loading and hoisting and a smaller diesel for swinging. This is said to increase greatly the speed of the machine by giving a more rapid hoist and swing. In addition it is stated that this new walking dragline is more compact and less expensive than former single-engine models with the same total horsepower.

On the lower or main deck of the dragline are located the large Page horizontal diesel, the drum set, walking gear, walking shaft and for exceptionally fast swinging two vertical-drive electric swing motors. The upper deck, which is directly above the large diesel and is reached by ship stairs, has the smaller diesel, also a Page horizontal-



One of the new Page two-engine diesel-powered walking draglines.

type, and the generator used in furnishing power for swinging. This arrangement of engines and machinery all within the main trusses permits shipment of most of the machinery intact, without

dismantling.

Complete information on this new Page two-engine diesel-powered walker may be secured by those interested direct from the manufacturer.

Look what an **R.B. FINEGRADER** *will do for you!*



One pass and the grade is RIGHT TO SPECIFICATIONS!

ANOTHER COST CUTTER



THE BUCKEYE ROAD WIDENER

For digging subgrade trench at the rate of a mile or more a day. One man operated, it speeds up operations and saves money. Built in two sizes to dig trench up to 48" wide in one cut. Write for literature now.

LOOK at the illustrations above—they show how an R. B. Finegrader cuts into a roughly prepared subgrade and leaves it *right on the payline* ready for the paving crew! This machine prepares the grade at a cost way below trial and error hand methods and leaves it right to specifications so that you don't put in extra concrete to fill up low spots—it puts material where you want it on the shoulders and it moves fast—always way out ahead of the paver. For concrete or waterbound macadam roads—any width—any kind of soil—you'll find the R. B. Finegrader is a profit-making machine. It eliminates the bottleneck in an otherwise completely mechanized job. Plan now to modernize your grade building methods. Write for descriptive catalog on the R. B. Finegrader today.

BUCKEYE TRACTION DITCHER CO.
FINDLAY OHIO

BUILT BY Buckeye



Convertible shovels



Trenchers . . .



Tractor Equipment



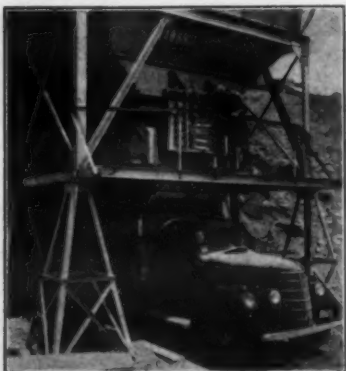
R. B. Finegraders



Road Wideners . . .



Spreaders . . .



This Blaw-Knox 108-ton three-compartment bin and batcher batched for a 34-E dual-drum paver and a 27-E single-drum paver on the Midwest Construction & Asphalt Co. paving contract on the Pennsylvania Turnpike.

Dual Batcher Plant For 34-E, 27-E Pavers

The double-action or dual batching plant, produced by the Blaw-Knox Co. of Pittsburgh, Pa., for use on one of the many paving contracts for the Pennsylvania Turnpike, is an example of the developments in construction equipment stimulated by that 160-mile highway project.

This plant, used by the Midwest Construction & Asphalt Co. on its job near Kecksburg, Pa., is of the portable three-compartment type with a special hopper section to accommodate two batchers. Each batcher is a 1 1/4-yard three-material weighing unit equipped with six-beam scales, and the plant has been feeding both a 34-E and a 27-E paver.

Either batcher can be used for either size batch, and the practice has been to use three beams for one batch schedule and the other three beams for the other size batch. The operator therefore does not have to change the poise settings. Moreover both batchers can and do discharge simultaneously into two-batch trucks without the need of intermediate truck movements. Once the truck is identified by the operator, it is a simple matter to throw the proper set of beams in or out of engagement with the master beam by means of the trig locks. The identification too is simplified by having the batch trucks marked with flags to indicate the size of the batch required. This gives the batching operator advance notice of the size of batch required.

If desired at some future time, the special bin hopper section can be replaced with another hopper and single batcher to form a conventional plant.

Automotive-Aeronautics Division Changes Name

Announcement has been made by the Bureau of Foreign and Domestic Com-

merce of the U. S. Department of Commerce that the name of the Automotive-Aeronautics Trade Division has been changed to Motive Products Division and that the Railway Equipment Section, formerly a part of the Transportation Division, has been transferred to the Motive Products Division. P. R. Mattix is Chief of this Division.

Haynes Stellite Builds Addition To Its Plant

Haynes Stellite Co., Unit of Union Carbide & Carbon Corp., is expanding its manufacturing facilities at its plant in Kokomo, Indiana, by the addition of a new 75 x 132-foot factory building, a one-story structure of steel and brick with concrete floor and wide monitor top. Construction was started May 27 and the building was ready for use in August. It will house machinery for the manufacture of Haynes Stellite alloy products such as metal-cutting tools, hard-facing rods, and special castings.

New Catalogs Describe Two New Rock Hammers

Two new bulletins describing its No. 24 and the No. 45 rock hammers respectively have recently been issued by the Worthington Pump & Machinery Corp., Harrison, N. J. According to the manufacturer, the No. 24 rock hammer is a rugged machine providing large drilling capacity with low air consumption.

Among its features are three-speed rotation, adjustment being made quickly from the outside; simple positive valve; and a strong handy drop-forged retainer. The No. 45 is the newest middle-weight rock hammer offered by Worthington, designed specifically for continuous operation. Its features include separate blower valve, easy throttle action, low air consumption, built-in lubricator and swivel type inlet in head.

YOU can DEPEND on

GRUENDLER EQUIPMENT

DEPENDABLE — Long Life, Low Power Costs and Upkeep. Complete Safety

Stationary or Portable

HAMMER CRUSHERS

For All Type Roads: Whether Mountain or Farm to Market or State Highway

Two-In-One

Portable Unit with Bucket Elevator

GRUENDLER CRUSHER & PULVERIZER CO.

2917-27 N. Market St., St. Louis, Mo.

BETTER CONCRETE IN SHORTER TIME WITH CALCIUM CHLORIDE IN THE MIX

The Results of Actual Field Tests Show

● 63% GREATER 3-DAY STRENGTH

Follow the arrow No. 1; note that concrete with calcium chloride had 675 lbs. transverse strength at 3 days (well above usual state requirements for pavement opening) as against 415 lbs. for plain concrete, a gain of 63% by use of calcium chloride.

● 4-HOUR REDUCTION IN FINISHING TIME

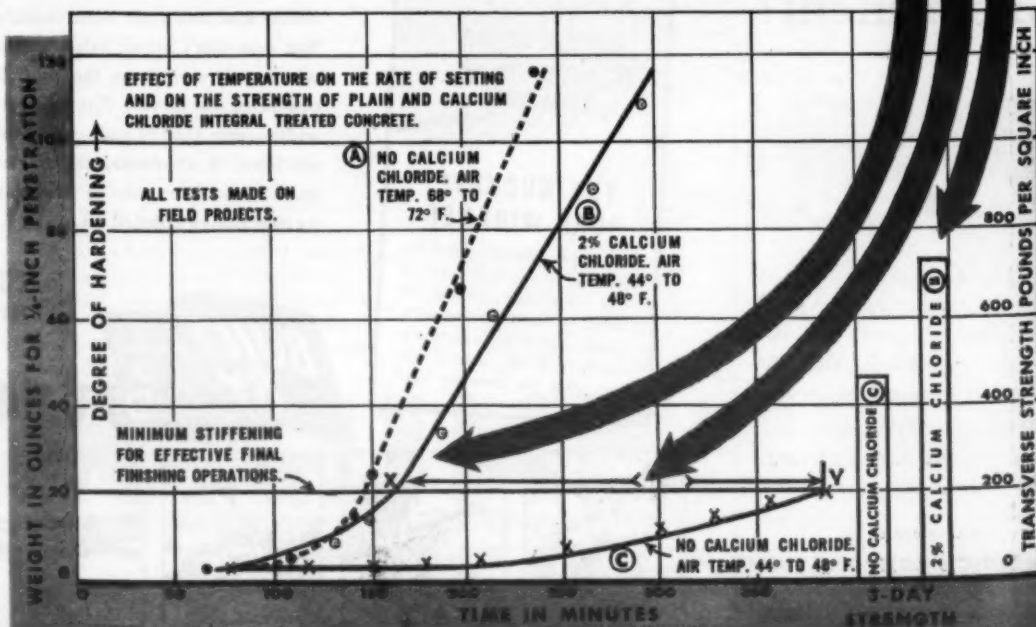
The reduction in time to reach minimum stiffening for effective final finishing shown at the point of arrow No. 2—X to Y—approximately four hours—permits, as in this case, a saving in finishing costs sufficient to pay for the calcium chloride.

● MAKES UP 24° TEMPERATURE DIFFERENCE TO GIVE IDEAL CONDITIONS

Follow arrow No. 3; note that calcium chloride treated concrete placed at air temperature of 44-48° acquired necessary stiffness for finishing in almost exactly the same time as plain concrete placed at air temperature 70°. Calcium chloride thus practically offsets the usual considerable strength losses in concrete poured at from 60 down to 40 degrees.

To attain these beneficial results is both economical and simple. Two pounds of calcium chloride (costing 2 to 3 cents) per bag of cement should be added to the concrete mix, and can be introduced, in flake form, directly into the skip. Innumerable field tests have shown that the addition of calcium chloride will produce normal summer reaction in cold weather concrete, with correspondingly high early strength, thus permitting earlier finishing and quicker removal of forms. It will also improve density and water resistance, make concrete flow and fill forms better and produce the high early strength so important in cool to freezing temperature ranges. A detailed description of the penetration apparatus and procedure used in these tests, and literature on the use of calcium chloride in concreting are available on request.

CALCIUM CHLORIDE ASSOCIATION 4145 PENOBSCOT BUILDING, DETROIT, MICHIGAN



Are You Tired of Pump Headaches?



Marlow Pumps give continuous and genuine satisfaction. Sizes 1 1/2" to 10" self-priming centrifugal. Also diaphragm and plunger pumps.

Ask for Bulletin CEM-42

MARLOW PUMPS
Ridgewood New Jersey

Lubrication Habits Affect Machine Life

Selection of Right Type As Well As Good Grade of Lubricant for Each Part Is Essential

Part II

THE importance of proper lubrication of construction equipment, and its contribution to performance and profits, were discussed in Part I of this article which appeared in the August issue of *CONTRACTORS AND ENGINEERS MONTHLY*. Covering an individual discussion of lubrication for steam cylinders, bearings, and gasoline and diesel engines in the first part of this article, we now proceed to the lubrication problems of other types of equipment used in the construction field.

Air Equipment

When compressed air is used for power, the prime mover is a diesel or a gasoline engine direct-connected to an air compressor usually of the four-cylinder single-stage horizontal type. In such service, no attempt is made to cool the air; instead it is heated to approximately 400 degrees F. to utilize all the available energy. This is done by passing the discharge from the compressor through a suitable heat exchanger which utilizes the exhaust gases from the engine.

Compressor oils must, of course, be suited to operating conditions. Primarily they must possess adequate viscosity at the operating temperatures and show as low a tendency as possible to vaporize and develop accumulation of hard carbon residues.

Time is also a factor. The longer an oil remains within the compressor cylinders, the more carbon can be expected. There will, however, also be some siliceous material present in these deposits, especially if the air filters are not entirely effective, the binder usually being gummy matter from decomposed oil. This latter can be reduced if the oil has a narrow range of distillation, with a fairly low end point. The viscosity must also be low, around an S.A.E. 10 to 20. Otherwise, instead of

vaporizing cleanly, it may break down, become sticky, and collect dirt brought in by the air. The slower the process of dissociation or the greater the volume of oil involved, the more carbon will ultimately be formed.

Petroleum carbon may be hard or dust-like. The latter often passes out with the air, or it collects in pockets, elbows and on sharp edges and becomes mixed with dirt taken in by the air as well as with oil which has been vaporized in the cylinders and later condensed at these points. Hard carbon, in turn, is a nuisance, due to the possibility of accumulation on the valves and valve seats, and in the ends of the cylinders. This may cut or score the valves or cause them to leak.

Here again the closely-fractionated

LUBRICATION FOR CONSTRUCTION EQUIPMENT

Prepared by A. F. Brewer, Technical and Research Division, The Texas Co.

Type of Operation	Viscosity Range		Lubricant Characteristics		Carbon Residue by Test
	Sec. S. U. at 100 F.	Sec. S. U. at 210 F.	S.A.E. No.	Degrees F. Pour Test	
AIR COMPRESSORS					
Cylinders	160-330	44-54	10-20	0 max.	0.20 max.
External parts	300-530	45-60	20-30	0 to 10	.....
GEARS					
Exposed, or merely guarded	.....	500-1000	.....	.....	.....
Enclosed, where bath lubrication is possible	.....	90-230	90-230	0 to 20	.....
CHAINS					
Silent or link type—exposed	.....	90-230	90-230	0 to 20	.....
Roller type (usually exposed)	.....	80-90	80-90	around 0	.....
WIRE ROPE					
.....	.....	500-1000	.....	.....	.....
LINK PINS & ROLLERS (Oil Lubricated)					
.....	.....	90-140	90-140	0 to 30	.....

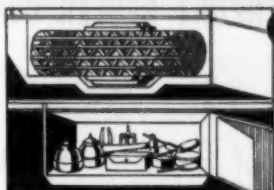
pale filtered type of distilled oil is beneficial. Such oils show the least tendency towards direct carbonization and the collection of carbonaceous matter. Furthermore any such direct carbon as may be formed through excessive use is light and fluffy.

Oil Feed for Compressors

Lubrication of the gasoline or diesel-powered air compressor is usually by

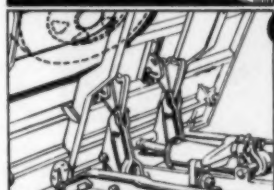
means of a type of hydrostatic lubricator, built as an integral part of the valve chest cover. In this device the oil feed can be regulated by means of an auxiliary sight feed lubricator, whereby the delivery of oil can be reduced to the required amount to permit effective lubrication, and yet prevent any possibility of the development of residual deposits in the air lines. In cold weather

(Concluded on page 44)



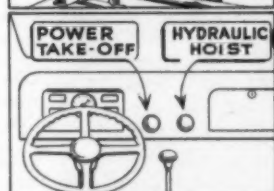
1 BUILT-IN TIRE AND TOOL PACK

This locker is built as an integral part of the body. No load space is sacrificed. Tire and tools are handy and locked from theft. Patented design requires no additional mounting height.



2 CENTER-LIFT HOIST

Only in HERCULES do you find the patented Center-Lift Hoist. Two-arm lift is always ahead of load center. Operates with less effort, no strain on body hinges, lower oil pressure.



3 BUTTON-EASE CONTROL

Balanced piston valve makes possible handy button control on dash to operate hoist. No levers! Finger tip control, with either low or high oil pressures. Both Hydraulic Hoist and Power Take-Off are operated by simple button controls on dash.



4 REVERSIBLE TAIL GATE HINGE

Another exclusive HERCULES feature. Reversing hinge pin and the forging changes tail gate from offset to straight type in a few seconds.

Again HERCULES leads in new and improved features. Point by point, HERCULES engineering advancement brings you stronger, sturdier body designs coupled with HERCULES patented Center Lift Hoist efficiency.

Whether it's heavy duty or light, fast hauling, you can depend on HERCULES welded, all-steel construction to stand the gaff. Operate the smooth-acting hydraulic hoist—note the extra features, and you'll choose HERCULES.

Look us up at the

NATIONAL AUTOMOBILE SHOW



RED DEVIL
LIGHT
and POWER PLANTS
800 to 50,000 WATTS



3,000 WATT
as illustrated **\$395.00**
on
Pneumatic Tires

Finish the job quicker and save money with electricity. Send for catalog describing generators and our complete line of portable poles for floodlighting.

E. B. KELLEY CO., Inc.
43-47 Vernon Blvd.
Long Island City, N. Y.

HERCULES STEEL PRODUCTS CO. GALION, OHIO

Grading, Setting Steel On Conn. Paving Project

(Continued from page 1)

of the curb and a sloping portion to which was welded the rounded section of the form which shaped the face of the curb. This angle and form were held to the top of the 4-inch rail by another slotted key bolt and wedge. This is shown very clearly in the accompanying illustration.

As the pouring of the concrete curbs proceeds rapidly, it would be inconvenient to pull a concrete mixer along the slab, or shoulder, to furnish the concrete for the work. For this reason ready-mixed concrete was purchased locally and delivered to boxes set at intervals along the slab. The concrete was then shoveled into rubber-tired wheelbarrows as required and wheeled to the exact spot where it was to be used and dumped into the forms. The forms were removed as soon as the concrete had its initial set and then they were hand-finished and dragged with canvas. During the hand finishing of the green concrete, a board exactly 1 inch thick was laid on the slab to give the 1-inch vertical face of the curb. As required by State specifications, the final rubbing of the curb was with Carborundum blocks.

Grading and Road Forms

The heavy grading by Patterson & Rossi, Inc., was done with two 12-yard Gar Wood scrapers, one pulled by an 80-hp Allis-Chalmers tractor and the other by a 112-hp Allis-Chalmers tractor. An A-C 65-hp tractor with a Baker bulldozer handled the usual odd jobs. The final grading was done with an Allis-Chalmers power grader. Drainage ditches were dug with a 1-yard P & H backhoe, and a 1 1/4-yard Northwest shovel worked on gravel borrow which was hauled to the job by two 7 1/2-ton Mack dump trucks and two 5 1/2-ton Mack dumps. These were supplemented by an average of seven International trucks hired locally.

The preparation of the fine grade by the Lane organization was done with two Caterpillar No. 10 motor graders, one of which afterwards worked on the shoulders. Four men were used on fine grade, one of them tamping under the forms all of the time, and all of whom went back with a scratch-board to check the fine grade immediately ahead of the paver. The fine grade was rolled with a 3-wheel Buffalo-Springfield 5-ton roller and then the final grade checked by two men with a scratch-board.

The same foreman who handled fine grade was in charge of setting the forms. A gang of seven men was used preparing the trench and two of the men did the actual setting of the forms. One of the two men working on fine grade was also responsible for the use of the hand sprayer by which oil was applied to the forms immediately ahead of pouring.

Steel and Expansion Joints

Two and a half-foot deformed 1/2-inch round tie bars bent to a right angle were placed against the outside road form at mid-height on 2 1/2 foot centers, with the leg against the form protected by a slotted angle bar. These dowels were straightened before the second slab was poured in order to tie the two together.

The slabs were reinforced through-

out by welded bar mat placed 2 1/2 inches from the top on the struck concrete. This fabric weighed 69.18 pounds per 100 square feet for the 11-foot width and 68.88 pounds per 100 square feet for the 12-foot width. At all expansion joints, additional bottom bar mat was also placed 2 inches from the bottom of the slab and extended 5 feet on either side of the joint. During pouring, the bottom fabric was suspended by hooks and pipe bars extending across the entire slab. The top fabric was placed on the concrete after it had been struck off by a heavy steel strike-off moved by the paver winch.

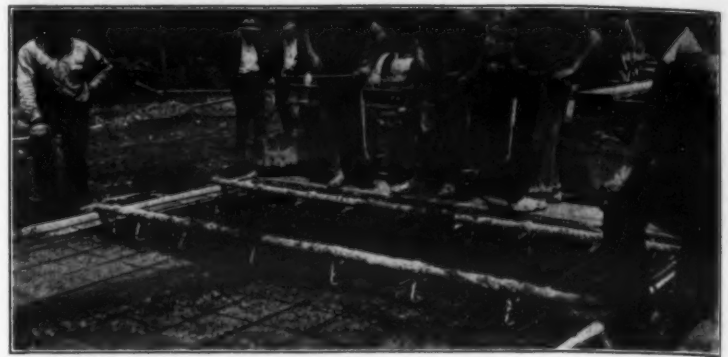
Expansion joints, composed of resin-impregnated cork 1/2 inch thick and 7 inches high, were placed at intervals of 73 feet 4 inches. The load-transfer units for the expansion joints were furnished by A. H. Harris Co., New Britain, Conn., and consisted of malleable iron bars extending 7 inches into each slab, supported by 3/4-inch angles which in turn rested on 3/4 x 7/16-inch transverse channels.

Pouring and Finishing

The batching plant was located on the same highway 1/2-mile dead haul from the end of this project. It had been set up for pouring the section immediately to the north of the one described in this article and consisted of a Blaw-Knox batching plant, served by a Bucyrus-Erie crane with a 40-foot boom and a 3/4-yard Williams clamshell. Although the plant was located on a spur track, all of the aggregate was delivered by truck from local plants, and then handled from stockpiles to the bins of the batching plant.

The average batch consisted of 1,737 pounds of 2-inch stone, 1,745 of 3/4-inch stone and 1,290 pounds of sand, with 564 pounds of Whitehall bulk cement stored and batched in a Blaw-Knox bulk cement plant manned by one laborer and weighman. From four to six 3-batch International trucks, hired locally, were used for hauling the weighed batches from the plant to the paver. These trucks all turned through a break in the forms and backed to the paver which ran on the subgrade of the slab being poured.

The batch man dumped the batches into the skip of a 27-E Ransome paver where the batch was given a 1 1/4-minute mix. The dumper also handled the wetting of the grade ahead of the paver. The grade dried out very rapidly under



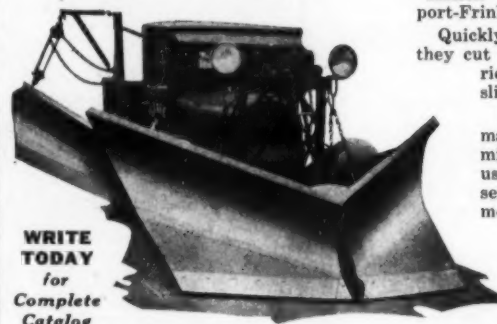
C. & F. M. Photo
"Headless" puddlers await the morning's first batch of concrete. Note the method of supporting the reinforcing during pouring, and the iron step on the puddlers' shovels.

the sun even after the continuous heavy rains in the latter part of May. The paver carried two 150-foot hose complete with couplings, and the valves on the 2-inch water lines were spaced about 250 feet apart. Water for the

entire job was supplied by a Barnes triplex pump located at the south end of the job. The hose from the paver was carried on a boom across the adjacent slab or center strip to minimize (Concluded on next page)

PREPARE! *Early and Well*

WITH
**DAVENPORT-FRINK
SNO-PLOWS**



WRITE
TODAY
for
Complete
Catalog

SELF BALLASTING • ABSENCE OF SIDE THRUST • PUSHES EASIER • BEVELS THE SIDE BANKS • WILL NOT WEDGE • LIGHT, YET RUGGED • LESS UNSPRUNG WEIGHT • SAFER AT HIGH SPEED • NOSE ICE PLATE • ADJUSTMENT WITHOUT TOOLS • QUICKLY ATTACHED AND DETACHED • INTERCHANGEABLE

EVERY SIZE and TYPE Whatever your power equipment—trucks or tractors—large or small—you'll find V Blade and Straight Blade Davenport-Frink Sno-Plows exactly suited to them.

Made in Eastern U.S.A. by Carl H. Frink, 1000 Islands, Clayton, New York

DAVENPORT BESLER CORPORATION 4220 Rockingham Road Davenport . . . Iowa

When you awake some morning to an emergency call and find that "bomber" clouds accompanied by "fighter" winds have put your highways out of commission—well—it's a satisfaction to be able to order "Action" to a battery of Davenport-Frink Sno-Plows.

Quickly, safely and economically they cut through every snow barrier and clean your roads slick as a whistle.

RIGHT NOW!—while the matter is fresh on your mind—drop us a line—tell us your needs. We'll gladly send a catalog and recommendations.

For FASTER - SAFER
and CLEANER SNOW
REMOVAL UNDER
ALL CONDITIONS

STRAYER *Portable* MOVES IN CLOSE TO JOB 10 BATCHES (8 1/2 yds of concrete) SWUNG INTO FORMS IN 21 MINUTES



Includes 20 Ton Bin, Bucket Elevator, Cement Hopper, weighing Aggre-meter, approved Cement Mixer, Water Tank, Batch Meter, Gas Engine, etc., all mounted on sturdy Trailer.

3/4 yd. Strayer Portable owned by Thos. DeFalco handled this 1400 yd. bridge job for J. F. Fitzgerald Construction Company, General Contractor.

—that is just average output. A few days before the picture, this Portable Plant moved down near the 1400 yard bridge abutment job in Gilbertville, Mass., by now, Thomas DeFalco has moved the plant through several jobs over many miles.

On-the-spot concrete to specifications and at rock bottom costs make this plant a profit winner. Depending on locality, this portable concrete plant will pay for itself in the making of 6,000 to 10,000 yds. of concrete.

Give us your problem, get our figures on the Strayer Plant that will take small and large jobs in its stride.



Used Equipment for Sale

One Barber-Greene 24" x 36" Style "N" Belt Conveyor.
One Barber-Greene Type "U" Belt Conveyor.
One 15-ton Buffalo-Springfield 3-Wheel Roller (at Kingston, N.Y.).

R. E. LINDSTROM

8 So. Clinton St. Chicago, Ill.

ERIE STEEL CONSTRUCTION CO. • ERIE, PA.

Conn. Road Relocated, Made Into Boulevard

(Continued from preceding page)

the dragging of the hose, and when moving was necessary one of the grade men looped the hose and rolled the loop down the line.

With the paver pouring an average of 1,300 feet of slab in 8 hours, the puddlers and finishing crew were kept hustling. On the 12-foot 7-inch slab, three puddlers were used and on the 11-foot slab only two. One of the puddlers showed his ingenuity by suggesting the welding of a small piece of scrap iron to the top of the Knoxall spades, to the left of the handles, so that when the men pushed the spade into the concrete it would not be as tiring on the foot nor wear out the shoe soles readily. A Viber electric vibrator was used along both forms and on both sides of all joints and around manhole castings to insure dense concrete. The operator sheathed the lower part of the vibrator with a piece of inner tubing to prevent its spattering grout on his trousers.

A Blaw-Knox gas-electric double-screed finisher with a vibrator between the two screeds was used for the initial finish, with the three puddlers and the two steel men working ahead of it. An unusually heavy surcharge of the dry concrete was carried on the front screed of the finisher to insure the spreading of a dense concrete. For this purpose the front screed was built to nearly double the usual height. Immediately behind the finisher the Koehring longitudinal finisher was used.

Behind the longitudinal finisher one man worked on the two sides shoveling out the concrete which had slopped over onto the base of the forms which had previously been covered with dirt. This cleaned the bases thoroughly so that they could be easily stripped the following day after the center strip curb had been completed. The hand-finishers used triangular lutes and 10-foot Cleveland aluminum straight-edges and also "sleeve-board" floats for finishing. The helper worked up front with one finisher and the second finisher worked back on the joints.

Cotton Mat Curing

Immediately after finishing and brooming the surface, heavy cotton mats saturated with water were placed on the slab and left for three days. These curing mats were rolled on 2 x 2's and measured 13 x 15 feet. They were laid crosswise on the wide lanes and longitudinally on the 11-foot lanes. Two men were used to place the mats and one man kept them wet.

Major Quantities

The major quantities and unit prices bid on this contract were as follows:

Revised Estimated Major Quantities		
Clearing and grubbing.....	Lump sum	\$500.00
Unclassified excavation.....	23,562 cu. yds.	.23
Trim excavation, 0 to 5 ft.....	2,865 cu. yds.	1.00
Trim excavation, 5 to 10 ft.....	2,865 cu. yds.	1.50
Formation of subgrade.....		
(fine grading).....	24,647 sq. yds.	.10
Shaping slopes and shoulders.....	4,672 lin. ft.	.15
Gravel-filled sub-base, 12-inch.....	11,100 cu. yds.	.70
Broken stone base for bituminous macadam at intersections.....	799 tons	1.50
Concrete pavement—8 inches thick uniform.....	4,069 cu. yds.	4.32
Welded wire fabric reinforcement.....	1,907 sq. yds.	.22
Transverse expansion joints.....	2,900 lin. ft.	.60
Broken stone for bituminous macadam.....	366 tons	3.80
Asphalt for penetration.....	3,833 gals.	.10
Asphalt for surface treatment.....	6,527 gals.	.11
Class B concrete for head walls and culverts (1: 2: 3).....	50 yds.	15.00
Deformed 5/8-inch round steel tie bars.....	6,112 lbs.	.05
15-inch reinforced concrete pipe, ribbed.....	1,212 ft.	1.30
18-inch reinforced concrete pipe, ribbed.....	1,712 ft.	1.60
24-inch reinforced concrete pipe, ribbed.....	800 ft.	2.20
24-inch reinforced concrete pipe, smooth.....	1,260 ft.	4.00
Dovetailed concrete park curb.....	7,681 lin. ft.	.30
Portland cement.....	7,353 bbls.	2.45

Personnel

Contract 4 on PWA Project 1309-4-F

in Connecticut was awarded to Patterson & Rossi on its low bid of \$88,038.41. The work was done under the direction of Adolph Rossi as Superintendent for the general contractor. The concrete pavement was laid under the direction of C. M. Hamilton, Superintendent, and William Stanton, Assistant Superintendent, for the Lane Construction Corp. G. Pavelka was Chief Inspector for the Connecticut State Highway Department and L. Gitchell, Assistant.

Sickle Bar Designed For Highway Mowing

Believing that highway border mowing presents the most severe test of a tractor and sickle bar, the latest model of the Worthington sickle bar arrangement was developed particularly for this type of service. With this machine, all kinds of roadside conditions can be handled, no matter how steep the angle of up or down grade, according to the

manufacturer.

The new reciprocating differential drive mechanism located on the inner shoe would permit the operation of the sickle bar through a full 360-degree angle, were it not for the tractor chassis limiting the range. This entire driving mechanism is enclosed in grease and dust-proof housings and runs in a bath of oil. It is a direct drive from the Pitman flywheel through a Pitman rod and the knife action is continuous for the full stroke of the rod at any degree.

The new Worthington sickle bar is available with the conventional hand lift aided by a powerful balanced spring located within easy reach of the driver's seat, or a power hydraulic lift which is optional at slightly higher cost. This sickle bar mounted on a Model C Worthington tractor has a mowing speed up to 6 miles an hour and a travel speed with the bar raised of 32 miles an hour. The standard Massey Harris sickle bar and knife section is 5 feet long and of all steel construction with reinforced finger bar.

Complete details on this Worthington highway mower is contained in a 4-page folder which the Worthington Mower Co., Stroudsburg, Pa., will be glad to send to state and county highway engineers upon request.

New Saw Manual

The Porter-Cable Machine Co., Syracuse, N. Y., has recently issued a new Saw Manual which should prove valuable to anyone who would have use for a Speedmatic saw. In addition to describing and illustrating the Speedmatic saw, there is included information on how to use the saws with greatest profits, time and money-saving suggestions, estimating data, the care of saws, its many uses and specifications.

The Speedmatic radial arm and Porter-Cable sanders and edgers are also described in this manual, copies of which may be obtained direct from the manufacturer by mentioning this item.

"HOW DO I MAKE MONEY ON THESE SMALL JOBS?"

Why—I have a set of **BLAW-KNOX STEEL FORMS** which will build most any cross section I bid on. Steel gives a nice, dense, smooth finish—expensive hand finishing unnecessary.

NATURALLY MY COSTS ARE LOW."

GET A COPY OF BLAW-KNOX CATALOG NO. 1527

BLAW-KNOX
Street and Sidewalk **STEEL FORMS**

BLAW-KNOX DIVISION
OF BLAW-KNOX CO.
FARMER BANK BLDG., PITTSBURGH, PA.

"THAT'S JUST ABOUT THE SLICKEST ROAD FINISHER I'VE SEEN"

"YES—AND IT SURE GIVES BIG YARDAGE WORKING ON THAT DRY CONCRETE"

If you're on the fence about buying a road finishing machine this season it will definitely pay you to get full information about this new **Blaw-Knox ROAD FINISHER**. You can depend upon this machine to maintain maximum job production schedules—even when working in dry concrete.

Ask about the ten exclusive features of the **Blaw-Knox Road Finisher** which make for better and faster paving. See it before buying.

BLAW-KNOX
ROAD FINISHERS

BLAW-KNOX DIVISION
OF BLAW-KNOX CO.
FARMER BANK BUILDING, PITTSBURGH, PA.

You equip yourself for profits when you invest in HEIL Road Machinery

Smooth operating 12 cu. yd. capacity Heil Dig-N-Carry Cable Scoop.

Complete, widely used line of dirt-moving units that load fast . . . dump fast . . . cut and spread accurately . . . turn in a short radius . . . hitch and unhitch easily. These dependable Heil operating advantages help many contractors do top-quality, clean-cut work, **RIGHT ON SCHEDULE**. Equip YOURSELF for profitable operation, with Heil Dig-N-Carry Scoops, Trail Builders and Bulldozers. Send today for free catalog.

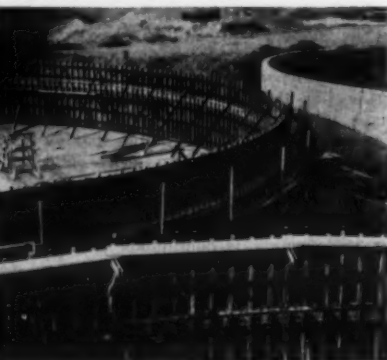
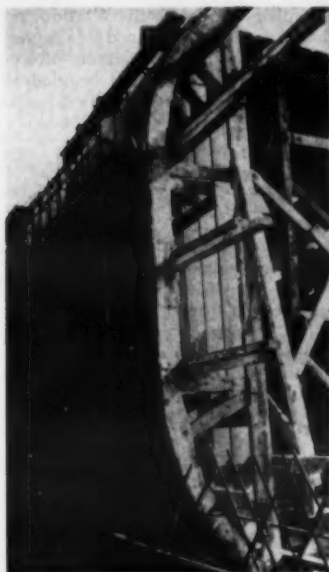
★ You get a big payoff every time with Heil Dig-N-Carry Hydraulic Scoops.

★ Left: Heil Trailer Scoops cut costs on long haul jobs.

★ Below: Heil-Baker two wheel scoop and Heil Trailbuilder.

THE HEIL CO.
MILWAUKEE, WISCONSIN
HILLSIDE, NEW JERSEY

Heil Scoops — Hydraulic Scoops — Heil Trailbuilders — Heil Bulldozers — Heil Trailers



One of the features of the construction of the Jamaica, N. Y., sewage works was the form work for the circular tanks. At the left is shown the forms for the flare curved aeration tank walls at the new sewage-treatment plant and, above, is the form assembly for the circular concrete tanks, showing its simplicity and the alignment obtained with a minimum of bracing. Richmond form ties and anchors were used. Concrete was placed directly in the forms by a Pumpcrete unit.

Form Work Feature Of Sewage Plant Job

A job involving interesting form work is now under construction at the Jamaica, N. Y., sewage treatment plant, with George F. Driscoll Co. as general contractor and the Moccia Construction Corp. as subcontractor on the form work and concreting. The project consists of two aeration tanks, 125 x 320 feet each, with appurtenant operating gallery, meter chambers and conduits; eight 120-foot diameter final tanks; twelve 80-foot diameter sludge digestion tanks; and two 55-foot sludge-thickening tanks, all complete with concrete pipe and reinforced concrete sewer connections.

The orderliness and speed of procedure at this project are due to the careful planning of the form work involved. The forms are constructed in especially designed panels for all typical structures, with full provision for anchorage and tying in of forms as they are set up. Careful attention to all details of the assembly, placing and anchorage of panels has practically eliminated all patch work forming and incidental bracing.

Forms for the flare curved aeration tank walls are built and placed in 4-foot long by full height complete segments. One of the illustrations shows this assembly. The circular concrete tanks are formed by a combination of typical panels and steel channel wales bent to proper contour. Bracing is required only at the inside form where provision is made for suitable anchorage for all braces in slab concrete already poured. Outside alignment is obtained by the use of rigid spreader ties. All form ties and anchors were supplied by the Richmond Screw Anchor Co., Inc.

Concrete is pumped into the forms from a central plant at the rate of 50 cubic yards an hour. Direct placement of the concrete is made from the pipe line into each section of the aeration tank wall. Rotary distribution is provided for placing concrete in the circular tank forms by means of a central tower hopper fed by the pipe line, and a revolving chute arrangement which places the concrete continuously around

the periphery of the tank.

This work was planned by P. Moccia of the Moccia Construction Corp., with J. Torkildsen, Field Superintendent.

New Bay City Dist. Mgr. In Southeastern States

Announcement has been made by Bay City Shovels, Inc., Bay City, Mich., of the appointment of T. R. Hall, Jr., as District Manager and Factory Sales Representative in the southeastern states, including Virginia, Tennessee, North and South Carolina and Florida. Mr. Hall, who is located at 609 Ireland St., Burlington, N. C., is well known in the con-

struction field, having been associated with International Harvester for a number of years and more recently with the Osgood and General companies and then Marion Steam Shovel Co.

Snow-Free Highways Profitable to Public

Clearing the highways of snow, a necessary activity for passage of the doctor's automobile or the fire truck or to insure supplies of food and other necessities to isolated communities, also has a decided dollars-and-cents value, according to the Automobile Manufacturers Association.

A new sidelight on the savings which can be realized by keeping the highways open is found in a special report by the Engineering Experiment Station of Iowa State College. Not so many years ago, the report points out, winter driving in certain sections of the country was attempted by only a few people. Cars were generally stored during the winter until the roads were clear of snow and ice and warmer weather made comfortable driving possible. In those days, highway departments did not hasten snow and ice removal.

However, with the improvements in cars which make winter driving comfortable, on some highways traffic is almost as heavy during the winter as in the summer. Snow removal has become a major service of state highway departments.

To determine the extent to which snow removal is economically justified, members of the college engineering staff studied operating costs of 248 automobiles used by rural mail carriers in Iowa, Indiana and Alabama. The survey indi-

cated that expenditures for snow removal during a 90-day winter season is \$225 per mile for a traffic volume of 500 vehicles each 24 hours. If savings in cost due to savings in the motorist's time are added to savings in car operating costs, \$549 per mile would be justified for the same volume of traffic for the winter.

Catalog On Couplings

A new 12-page illustrated catalog has recently been published by the Link-Belt Co., 307 N. Michigan Ave., Chicago, Ill., on its complete line of flexible couplings. Complete price and dimensional data on Types A, B, and RC couplings are contained in the catalog, together with information on revolving and stationary casings for the RC type. The most recent addition to the line, a horizontally-split aluminum casing, is described fully, and simple selection tables and instructions for installation and lubrication are given.

A copy of this catalog, No. 1845, may be obtained from the manufacturer.

**THIS BOOK TELLS
HOW COSTS WERE CUT
IN PLACING OVER
10 MILLION
YARDS OF CONCRETE**



**FREE SEND FOR
YOUR COPY!**

This new book has been prepared specifically to give you complete design data and application information on the revolutionary Rex Pumpcrete—the pump that pumps concrete! It reviews the seven years of successful history behind the Rex Pumpcrete, points out exactly where and how you, too, can gain the many advantages Pumpcrete will bring to your jobs. Whether you bid underpasses, overpasses, viaducts, bridges, culverts, sewage plants, reservoirs, warehouses, buildings, etc., or whether your job is unusual or inaccessible, this book will undoubtedly give you many pointers that will lead the way to lower cost concrete placing! Send for your copy now before you bid! Ask for Bulletin 366—Address:

REX CHAIN BELT COMPANY
Dept. C-8,
1886 W. Bruce St.
Milwaukee, Wisconsin

BE THE WINNING BIDDER WITH

PUMPCRETE

THE PUMP THAT PUMPS CONCRETE

MARMON-HERRINGTON All-Wheel-Drive Converted Ford



**"The Only Truck that Could Reach
the Dump With Its Load"
... Says One Owner**

In general construction hauling, road building, and similar work, yardage moved is the only real basis for judging the value of a truck—and on this basis Marmon-Herrington All-Wheel-Drive Converted Fords are the least expensive and most profitable equipment you can own. They will go places, through axle-deep sand, dirt, mud or snow, where no other trucks on the job can operate. They will climb steeper grades with bigger loads. They will make better speed with safety on slippery highways. Even for ordinary hauling jobs they are superior, and when the "going" is too tough for conventional drive trucks, Marmon-Herringtons keep the job moving. Make us prove these statements. Write for literature. Cable address MARTON, Indianapolis, Indiana, U.S.A.

MARMON-HERRINGTON COMPANY, INC.
INDIANAPOLIS, INDIANA, U.S.A.

Carey Elastite
EXPANSION
JOINT

Standard in Concrete Construction for 25 Years
ECONOMICAL and EFFICIENT

Asphalt Joint • Rubber Joint
Non-Extruding Expansion Joint
Plate Dowel Expansion Joint
Sub-grade Felt

THE PHILIP CAREY COMPANY
Representative Products Since 1875
LOCKLAND CINCINNATI OHIO

Engine Performance Checked by Analyzers

(Continued from page 19)

tion of the engine on which he is working. He should be familiar with the fact that in automotive engines, maximum power air-fuel ratios are somewhat richer than maximum economy air-fuel ratios, and yet road economy will often be lowered instead of increased if carburetion is lean to a point where there is an appreciable loss of power. This may be true even though the engine continues to operate smoothly without "flat spots" or spitting.

Uses in Repair Shop

Analyzers have two chief purposes in the maintenance or repair shop. The first is for determination of carburetor settings to fit a given special operation. This is sometimes advisable as vehicle manufacturers are forced to set the carburetors on their engines for many different services, and use those settings which are best for the largest percentage of their customers. It is not necessary to re-establish the setting of a carburetor each time it is overhauled, or to set up an individual adjustment for the carburetor of each engine of the same kind in a fleet, where all are used in similar service. For a given engine in a given service there is one setting that is best, and if any motor does not operate satisfactorily with this setting, look elsewhere for the trouble. You won't cover it up by changing jets.

To establish carburetor setting for any one type of service, the vehicle should be taken out on the road. A study of air-fuel ratios should be made at 5-mph intervals throughout the operating speed range of the vehicle. This should first be made under part-throttle conditions, and later repeated at wide-open throttle. A chassis dynamometer, if one is available, may simplify this operation. Results of a dynamometer test, however, should be checked afterwards by a brief road test.

This brings us to the second use of exhaust gas analyzers in shop work: periodic carburetor inspection. Once carburetor settings for each type of vehicle have been established, periodical inspection is necessary to see that carburetors are working properly after

having been in service for some time. This can be done on the garage floor, or on a dynamometer if available.

First adjust air-fuel ratios for idling. In passenger cars a smooth idle is necessary for customer satisfaction, but in fleet operation a nonstalling economical idle is more important. Engines in general fleet service today use from 1/3 gallon to 1 gallon per hour while idling. The richer mixtures necessary for smooth idling tend to produce obnoxious heavy smoke and odor, especially undesirable in city service. Idle air-fuel ratios for most commercial engines should be between 12.2 to 1 and 13 to 1 for best operation. Be sure the motor has reached its usual operating temperature before making adjustments to obtain these ratios.

After the proper idle is established, leave the analyzer connected and open the throttle partially. Following some immediate enrichment, the analyzer needle probably should swing to a leaner position. If it does not, the carburetor should be removed and over-

hauled. Also, if slight throttle pumping fails to produce some momentary enrichment, a faulty accelerating system is indicated, and again the carburetor is probably in need of repair.

In checking carburetor settings, use as a baseline for comparison those settings previously established throughout the operating speed ranges, preferably using a new carburetor. Remember also to use a vacuum gage indicator when taking any air-fuel ratio data, as this provides a scale of throttle openings for comparative work.

They Are Well Worth While

Mr. Smith, who in his capacity as Fleet Engineer for the Ethyl Gasoline Corp. has made a wide study of truck engine operation and efficiency, states that an exhaust gas analyzer should be regarded as essential equipment in any fleet shop, as important as a timing light, engine speed indicator, or fuel pump test kit. Accurate, reliable analyzers can be purchased, suitable for all types of work, at a price within the

average shop budget. Remember that they are sensitive and delicate instruments. They must be handled with care, properly cleaned and properly balanced at regular intervals. So valuable are these instruments in aviation that they have been built into a number of large airplanes as standard equipment, mounted with the indicator within view of the pilot to help guide him in keeping the fuel mixture of each engine constantly adjusted to correct air-fuel ratio.

Bulletin On Buckets

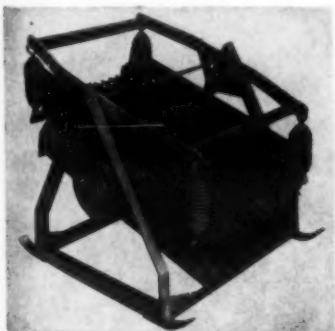
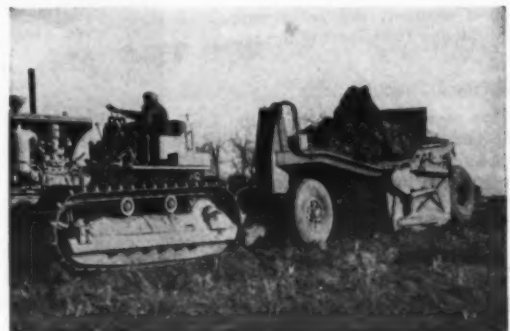
The Hayward Co., 50 Church St., New York City, has issued a bulletin describing briefly the construction features and applications of the various types of buckets in the Hayward line. These include clamshell buckets, of three types, four types of orangepeel buckets and dragline or drag scraper buckets. A reel that automatically pays out and takes up cable, used for operation of Hayward electric-motor buckets and lifting magnets, is also described.



● On every kind of project . . . in every kind of soil . . . A-W Scrapers have proved their ability to consistently handle that *extra* yardage which saves time and money.

Long life and low maintenance cost adds to profitable ownership of A-W Scrapers. Electrically welded special-alloy steel construction withstands wear and tear of toughest service. On the 5-yard scraper, the single cable control speeds every scraper operation, reduces time out for cable repairs.

The hydraulic controls of the 12-yard model are powered by an engine mounted on the scraper, assuring fast and positive control of gate pan and push out door . . . the whole power of the tractor is available for digging. THE AUSTIN-WESTERN ROAD MACHINERY CO., Aurora, Ill.



THIS PORTABLE VIBRATING SCREEN

accurately separates 3 sizes of 100 tons of material per day. Uses only the power of 2-hp. gas engine or 1-hp. electric motor. Self-contained, easily moved. Ideal for road and construction work, concrete block making and in small quarries and factories. Available through your local equipment distributor.

Send for
"CONTRACTOR'S
SCREEN"
Bulletin 110

ROBINS

ROBINS CONVEYING BELT COMPANY
Passaic, New Jersey

Offices in principal cities.

Hydraulic Scrapers
Motor Graders
Blade Graders
Elevating Graders
Cable Scrapers
Motor Sweepers

Austin-Western

Crushing and Screening
Plants
Rollers
Roll-A-Planes
Bituminous Distributors



C. & E. M. Photo

Making a high fill with Carryalls over a large arch culvert.

Rock "Heavy as Lead" Handled by Scrapers

(Continued from page 2)

The origin of the name "stinger" is slightly blurred but the limestone saw the point anyway. A "powder peddler" also thought the name was very appropriate as he admitted that its use prevented his selling some 5 tons of explosive for breaking the limestone.

The Dirt-Moving Outfit

The scraper outfit consisted of four D8 tractors with 12-yard Carryalls and an RD8 and an RD7 with LeTourneau bulldozers. A Caterpillar No. 12 Auto Patrol was used for cutting the slopes and then they were trimmed with a pulled grader as described below. An International ID-40 tractor with concrete-filled wheels was used for rolling the fills after the scrapers had spread them in 6-inch layers of earth. The rock was spread in 2-foot layers without rolling.

The rock drilling outfit was hired by the hour when needed and included an Ingersoll-Rand portable compressor, a Chicago Pneumatic compressor mounted on a Ford truck, a Davey similarly mounted and a sufficient number of jackhammers.

Floodlighting and Greasing

Four floodlighting units on the fill at the east end of the job permitted the Carryalls to work at night. In the day they worked toward the middle of the job where the rock was being moved as it was too dangerous to attempt the loading of rock under any but the best daytime conditions. The shifts were run three a day of 7 hours each.

For the greasing of the tractors and scrapers the groups were stopped from 11 to 12 a.m., 7 to 8 p.m. and 3 to 4 a.m. The greaser and the operators worked together to get the necessary lubrication out of the way. If there was need of unusual haste in getting the outfits going because of loss of time through bad weather, the units were picked off one at a time, leaving the rest working.

General Specifications

At the top of all cuts on this job the earth was rounded on a 3-foot radius for cuts of 6 feet and on a 10-foot radius for all cuts over 6 feet. An intercepting ditch was cut back of the top to remove surface water and prevent its running over the edge of the slope and starting washing. The sides of cuts were $2\frac{3}{4}$ to 1 and 2 to 1 down to rock and the rock slopes were left $\frac{1}{2}$ to 1. The ditches varied in width from 2 to 10 feet and always sloped from the road toward the backslope. The front slopes were uniformly $2\frac{3}{4}$ to 1 for this job which was for a 20-foot pavement with two 8-foot shoulders. On fills the top was 36 feet wide and the slopes uniformly $2\frac{3}{4}$ to 1. In all cuts there was a 1-foot sub-cut that was backfilled with suitable material for a cushion over rock or a prevention

against frost boils in clay.

Finishing With Staggered Wheels

As noted before, the slopes were cut with a power grader and then trimmed with a pulled grader. This was handled with a leaning-wheel grader towed by a tractor that remained on the top of the bank and the grader worked up and down as required. In order to give the maximum of efficiency to the grader, the leaning-wheel device was used to the limit. The front wheels were sloped out to hold the front end to the slope and the blade down while the rear wheels were sloped in to keep the machine from sliding down the slope. Thus the unit when parked after completing its work looked rather out of order. In fact one farmer said to the Superintendent, "That grader man must have had a bad accident with that machine; it's all knocked to hell." However, the next day the machine with the wheels set the same way was doing its mechanical bit to get the job completed and without any repairs or adjustments.

Some of the Quantities

There were 286,000 cubic yards of earth excavation in this job and 30,000 yards of rock excavation. Add to this 246,000 station-yards of overhaul, beyond the 1,000-foot free haul distance, and you will see that there was plenty to do, even without the troubles of loads of rain that made a mire out of the clay. Where the job crossed U. S. 20 near the west end, the contractor left a large amount of earth excavation until near the end of the work as he had a 53-foot fill, the lower portion of which was made up of a large part of the rock excavation on the job and he wanted the

dirt for topping out. This meant an 1,800-foot haul for most of the dirt. This was the highest fill on the job and was 600 feet long. The deepest cut was the rock cut just east of the fill and it too was about 600 feet long.

Personnel


Handling this outfit with the rock being moved with the scrapers and a large yardage of earth meant watching the production curve mighty carefully. At that, the outfit moved as much as 6,000 cubic yards a day in the three shifts. This grading contract was awarded to Western Contracting Corp. of Sioux City, Iowa, on its low bid of \$61,256.00 for the grading alone. T. F. Campbell was Superintendent for the contractor and S. A. Schackle was Resident Engineer for the State Highway Commission of Iowa.

Nomination blanks for the 1940 CONTRACTORS AND ENGINEERS MONTHLY Roadside Development Awards have

been distributed to the Landscape or Roadside Development Engineers of all the state highway departments. Other state highway department engineers who wish to submit nominations may secure as many blanks as they wish direct from this magazine.

**SIMPLE
RUGGED
DEPENDABLE**

CONSTRUCTION
EQUIPMENT



Specify **STERLING**
and be assured of
successful performance
by these **THOROUGHLY TRIED**
and **PROVEN**
PUMPS.

Write Today for Literature and Prices

Sterling

MICHENER CORPORATION
10000 Southpark Blvd. Dallas, Texas



"YOU NEED
**A MALL GASOLINE
POWERED VIBRATOR**
TO WIN AGAINST
TODAY'S COMPETITION"

THE VIBRATOR THAT'S MAKING HISTORY IN
SAVINGS ON TIME · LABOR · CEMENT · POWER

and in Producing Better Concrete!

Contractors who are writing job-winning estimates that show a profit are figuring MALL Gasoline Powered Vibrators into their bids because these efficient units enable them to make every short cut that cuts costs. More than this, they give all types of concrete an increased density and water tightness... a greater compressive and flexural strength... a greater resistance to weathering, plus a better bond with reinforcement. They are fool-proof, self-contained and operate without an air compressor or generator set.

Their variable speeds make them readily adaptable to many uses—CONCRETE VIBRATING, CONCRETE SURFACING, SAWING, FORM SANDING, PUMPING, WIRE BRUSHING, GRINDING, SHARPENING TOOLS and BITS, DRILLING IN WOOD, BRICK, CONCRETE, IRON OR STEEL.

As vibrators the 3 HP Gasoline Engine units deliver 7000 vibration frequencies per minute.

Write TODAY for FREE demonstration and full information.

MALL TOOL COMPANY

7743 South Chicago Ave., CHICAGO, ILL.

OFFICES AND DISTRIBUTORS IN PRINCIPAL CITIES



Operates all day on 1 1/2 to 2 gallons of gasoline.



Easy Inexpensive Patching with the **TORO** POWER ROLLER

Small, compact, easy to handle, this efficient and useful machine is making an enviable reputation in bituminous patching and construction work. It is easy to transport from job to job... runs on a fuel cost of 35 cents per day... can be operated by any ordinary workman... has 3 horsepower, air-cooled, 4 cycle motor... forward and reverse.

Send Today for Our Power Roller Catalog

TORO MANUFACTURING CORPORATION
MINNEAPOLIS MINNESOTA

Interchangeable Plows For Trucks, Tractors

The interchangeable feature of Root snow plows, made by the Root Spring Scraper Co., Kalamazoo, Mich., permits a swift change from blade to V-type plow when heavy snows require it. The hydraulic lift and all working parts attached to the truck are the same for both plows and a complete change can be made in 15 minutes.

Other features of these plows include the new Root double-cylinder Hi-Speed action direct lift, simple rugged construction, and economy of operation, according to the manufacturer. Heavy truck plow models are available in heights of 3 and 4 feet 2 inches, in widths from 7 feet 6 inches to 10 feet, and weights varying from 1,600 pounds to 2,750 pounds. For use with 1½-ton trucks, there are one blade and two V-type models to suit requirements.

Literature describing and illustrating the complete line of Root snow plows for motor trucks and tractors may be secured direct from the manufacturer by mentioning this item.

Bulletin On Jaw Crushers

Allis-Chalmers Mfg. Co., Milwaukee, Wis., has recently issued a new bulletin covering its four general types of jaw crushers, fine reduction, Dodge, Blake and Superior, illustrating and describing each and including sketches showing the principle of operation. The book covers construction features, capacity and dimension tables, and a general list of ores, rocks and other materials on which jaw crushers have been used.

Bits for Rock Drills

Timken rock bits are made in three distinct types, including the cross bit, the chisel bit, and the 6-point or rose bit. The cross and rose bits are made with both center hole and side hole, while the chisel bit is made with the side hole only. In addition three distinct varieties of thread have been developed for use on these bits. The "A" thread, of ¾-inch size, is used on the A-Series bits for secondary drilling in softer formations with light pneumatic drills. The "H" thread, with a nominal size of 1 inch, is used in the H, J and R-Series bits. Its general construction is similar to that of the "A" thread but is designed for heavier steel and more severe service. The "D" thread is used only

in the D-Series bits and is of rugged construction, heavy enough for the most severe drilling conditions.

A handy-sized booklet, describing these rock bits, illustrating their use on a variety of drilling jobs, and containing tables of sizes, steel lengths and prices, may be secured from the Timken Roller Bearing Co., Canton, Ohio.

New 10-S Mixer Has Air-Cooled Engine

The new Rex 10-S concrete mixer, recently announced by the Chain Belt Co., 1666 W. Bruce St., Milwaukee, Wis., is equipped with the type of air-cooled engine which has already been used successfully on the Rex 5-S and 7-S mixers.

Features claimed for these air-cooled engines are that they are simple in construction with few parts to go wrong; all lubrication is self-contained and automatic; they are light in weight; and require no anti-freeze mixture in winter. Besides the new power, this new 10-S

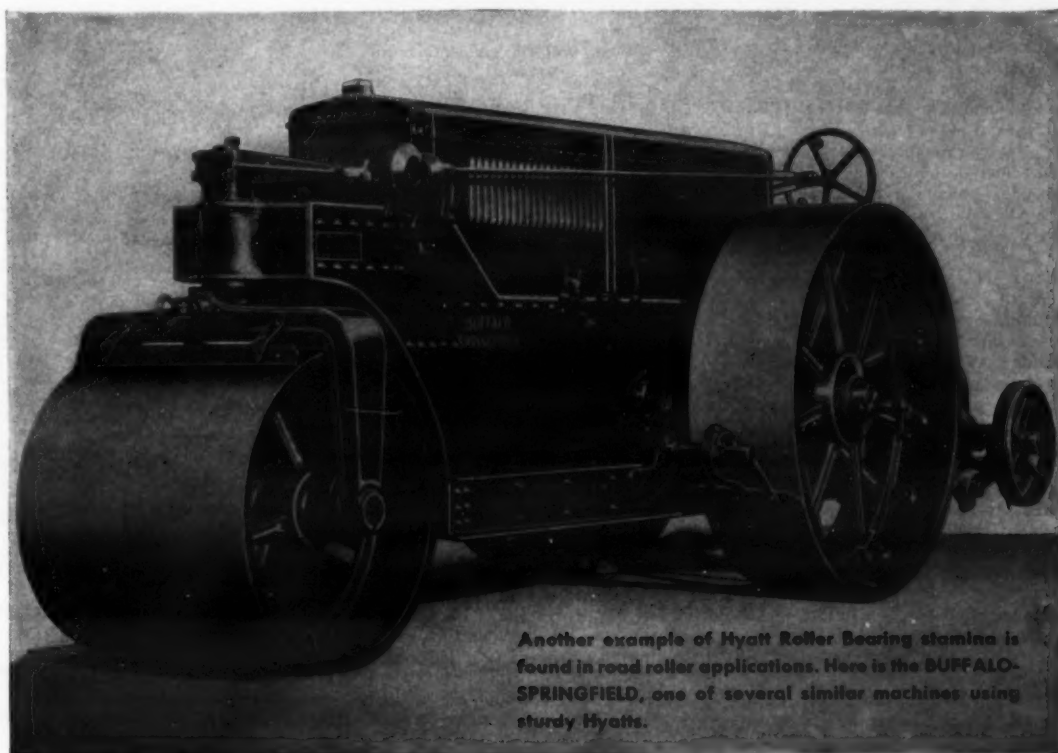


One of the new Rex 10-S mixers on a bridge job in northern Wisconsin.

mixer incorporates all the Rex exclusive features including the Rex shimmy skip, outside pivoted 7-second discharge, positive water system and free-way valve, Timken drum rollers, Rex chain drive and fully enclosed transmission counter-

shaft.

The Chain Belt Co. also manufactures all other standard size concrete mixers, pavers, Moto-Mixers and agitators, centrifugal water pumps, and Pumpcrete, the pump which pumps concrete.



Another example of Hyatt Roller Bearing stamino is found in road roller applications. Here is the BUFFALO-SPRINGFIELD, one of several similar machines using sturdy Hyatts.

Where Only the Fit Survive

HYATTS ARE USED when the going is tough... wherever friction, wear, and replacements must be avoided. With Hyatt Roller Bearings come *staying power* that prolongs machine life... *precision* that promotes better performance... *design* that guarantees greater mechanical efficiency.

Therefore, operating equipment of every kind is today more dependable and longer lived, because Hyatts help keep it fit for action. Hyatt Bearings Division, General Motors Sales Corporation, Harrison, New Jersey; Chicago, Pittsburgh, Detroit and San Francisco.

HYATT

R O L L E R B E A R I N G S

Q U I E T



Only JAEGER Pumps Have All These Features

- JAEGER PRIMING JET—Up to 5 times faster prime and re-prime—no adjustments, no need to "gun" engine.
- POSITIVE RECIRCULATION CUT-OFF—controlled by flow, not pressure.
- ACCESSIBLE SEAL—outlasts the impeller.
- PATENTED SELF-CLEANING SHELL.
- EVERY PUMP FACTORY TESTED for high capacity and pressure.
- COMPLETE RANGE OF SIZES, TYPES—3,000 to 220,000 g.p.h.

Send Today for Latest Catalog and Prices.

THE JAEGER MACHINE CO.
701 Dublin Ave., Columbus, Ohio

SODIUM LIGHTS ON WORLD'S LONGEST PONTOON BRIDGE



The Lake Washington Bridge in Seattle, which was officially dedicated in July, is being lighted by General Electric sodium lights. The system is comprised of 131 airplane-type sodium luminaires, each equipped with a 10,000-lumen lamp. The bridge, built by the Washington Toll Bridge Authority, has a pontoon span extending across $1\frac{1}{4}$ miles of Lake Washington.

Alemite Announces New Lubricating Gun

A new low-pressure volume delivery foot gun, designated as the Model 6697-A, has been announced by the Alemite Division, Stewart-Warner Corp., 1850 Diversey Parkway, Chicago, Ill. Manually operated, this latest Alemite product has been designed to serve a number of purposes: as an auxiliary to the stationary power gun used ordinarily in garages and depots housing large fleets; as standard equipment for smaller fleets where lubrication jobs are not of sufficient volume to justify the installation of a stationary power gun; for use in the field or where power is not available; and for lubricating many types of industrial equipment.

The gun has a capacity of 25 pounds and pumps approximately one cubic inch of grease per stroke. Maximum pressure when operated by hand is 3,000 pounds and when operated by foot, 5,000 pounds. It is equipped with a 7-foot hose and delivers one ounce of lubricant to every three strokes.

This new gun is intended as a companion to the Alemite high-pressure foot gun Model 6699-A. The latter, of 15-pound capacity, is designed primarily for chassis bearing lubrication at high pressures. The new gun, operating at a lesser pressure, offers the advantage of faster delivery as well as greater capac-

ity, and is particularly recommended for the lubrication of trucks with big wheel bearing and universal joint capacity, and gear boxes on large industrial equipment.

Further information on either or both of these Alemite guns may be secured by interested contractors and state and county highway engineers direct from the manufacturer or from this magazine.

New Catalog Describes Mechanical Rubber Goods

An interesting, well-illustrated catalog on the complete line of mechanical rubber goods manufactured by the Goodall Rubber Co. has recently been issued by that company. All types of hose for construction jobs, including steam and air hose, Roadbuilders water hose, concrete placing hose, suction and discharge hose, as well as couplings and fittings, conveyor belting, belts for elevating graders, transmission and V-belts, pump diaphragms, tarpaulins, and rubber boots and clothing are included in the Goodall line and are described and illustrated in this new catalog, which also contains three pages of technical tables.

Copies of this catalog, No. 207, may be secured by interested contractors and state and county highway engineers direct from the Goodall Rubber Co., Dept. Y, 5 So. 36th St., Philadelphia, Penna., or from this magazine.

New Two-Way Hoist Built in Three Sizes

The Burch Hydromotor hoist, made by the Burch Corp., Crestline, Ohio, for dump-truck bodies is a simple powerful hoist having but one moving part. This hoist is double-acting, the same power being exerted on the return cycle which brings the body back to horizontal position as that which raises the load. The body is always under full control of the operator when it is elevated to its highest point, or past the center with a capacity load, and can be brought back to any desired position, according to the manufacturer. This power return feature makes possible the lifting and moving of heavy objects from one place to another.

The pump is sturdy and constructed to provide power to handle excess loads. All parts subject to wear are protected by bronze alloy bearings and wearing plates. The control valve is simple and easy to operate. The hoist, pump and valve are built as a unit in a neat com-

pact assembly. This Hydromotor is available in three sizes, 8, 10, and 12-inch.

Further information on this dump-body hoist as well as on the complete line of Burch truck bodies is contained in Bulletin D. B. No. 5, copies of which may be secured by interested contractors and state and county highway engineers direct from the manufacturer by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

Aeroil OIL BURNING CONTRACTORS' EQUIPMENT

- KETTLES FOR TAR, PITCH & ASPHALT • EMULSION DISTRIBUTORS
- POWER SPRAYS • LEAD MELTING FURNACES • WEED BURNERS
- TORCHES & BURNERS

Send for FREE Bulletin No. 100-C

Aeroil Burner Co., Inc.
West New York, New Jersey
Chicago San Francisco Dallas



SETTING NEW STANDARDS of PERFORMANCE under all drainage needs!

It takes more than conversation about laboratory tests to prove performance. The place to test a corrugated pipe is in the ground under a well traveled highway! And not for a month, or year or a decade . . . but over a period of a quarter century or more of day in and day out exposure to the destructive elements and the hammering of heavy traffic. GOHI Corrugated Pipe for more than 30 years has been setting new standards of performance in the ground and eloquently telling its story of endurance in actual service.

New England Bolt Co. . . . Everett, Mass.
Central Culvert Co. . . . Ottumwa, Iowa
Capital City Culvert Co. . . . Madison, Wis.
Bancroft & Martin Rolling Mills Co. . . . S. Portland, Me.
Denver Steel and Iron Works Company . . . Denver, Colo.
The Lane Pipe Corporation . . . Bath, N. Y.
Dixie Culvert Mfg. Co. . . . Little Rock, Ark.
St. Paul Corrugating Co. . . . St. Paul, Minn.
The Newport Culvert Co. . . . Newport, Ky.

GOHI

GOHI Pipe meets Copper-Bearing Pure Iron requirements of all specifications published by nationally recognized specifying authorities.

72-page illustrated book on use of GOHI Pipe in modern drainage is yours for the asking. Address nearest fabricator.

GOHI CULVERT MANUFACTURERS, INC.
NEWPORT, KY.

"IT DIGS AND FILLS BETTER IN SHALE AND ROCK THAN ANY BUCKET I HAVE EVER USED"



• This statement came from a crane operator who for 25 years has worked with all types of buckets. The bucket which won his praise is a $\frac{3}{4}$ yard Multiple Rope Williams Bucket used by F. F. Mengel Company, Wisconsin Rapids.

The men at the controls know how Williams Buckets can help make time in digging and moving yardage. The men in the "front office" know how Williams Buckets stack up in long service and low maintenance cost.

THE WELLMAN ENGINEERING CO.
7012 Central Ave., Cleveland, Ohio

WILLIAMS Buckets
built by WELLMAN



Now . . .
WELDED Rolled Steel Construction

Bulletins describing all types of Williams Buckets sent free on request



Nuggies, a new line of wrenches recently brought out by Blackhawk.

New Wrench Set

Because of the use of a high-grade steel called Hexite, unusual compactness and strength are claimed for a new line of midget socket wrenches recently announced by the Blackhawk Mfg. Co., Milwaukee, Wis. These wrenches, called Nuggies, have $\frac{1}{4}$ -inch square drive, and socket sizes range from 3/16 to 7/16 inch.

Miniature "half and halves," combination open and box-type wrenches, accompany the midget socket wrenches in the new 18ND set which is furnished in a $5\frac{1}{2} \times 3\frac{9}{32}$ -inch red and black plastic container which slips into the coat pocket. The "half and halves" have openings from 7/32 to $\frac{3}{8}$ inch, the smallest tool being of "watch-charm" size. These Nuggies are designed for professional work on carburetor, magneto, ignition, and other delicate jobs involving small-size assemblies.

Copies of Catalog No. 240 describing Nuggies may be secured by interested contractors and state and county highway engineers and equipment men direct from the manufacturer by mentioning this item.

Want information on equipment?
Write the Editor.

Build Better Highways

Install Serviced Better Expansion Joints

Yes, Mr. Road Engineer and Mr. Contractor, Your plan for building

finer, longer lived highways should include Serviced expansion joints. Since 1914, Serviced has been originating, developing, perfecting expansion joints. To do the job better has been the goal of Serviced engineers—and better joints mean better highways. Whatever your preference or requirements—standard fiber, fibrated asphalt, sponge rubber, cork, cork rubber, or the new self-adjusting or self-conditioning joints—whatever your preference... specify Serviced. You can rely on Serviced to give you a quality product, and at reasonable cost, too.

SERVICISED PRODUCTS CORP.

6051 W. 65th Street Chicago

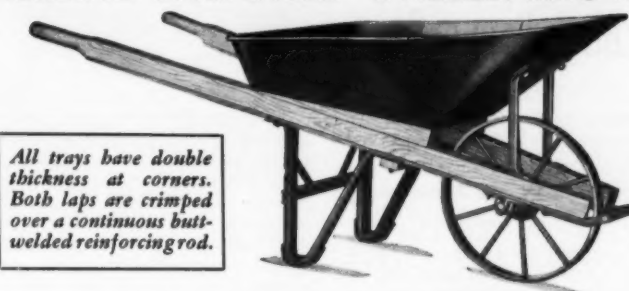
Makers, also, of Standard and Mineral Surfaced Asphalt Bridge Planking

New Dragline Bucket

The Biglode, a new streamlined all-welded dragline-bucket for general service, has just been placed on the market by the Harnischfeger Corp., 4419 W. National Ave., Milwaukee, Wis. Special features of the Biglode, which is available in capacities from $\frac{3}{8}$ to 4 cubic yards, include balanced construction for easier handling; simplified design, with arch, body, hitch plates, bucket lip and runners welded into a single unit to provide greater strength; and flared lip-and-teeth assembly to provide digging action similar to a round-nose shovel.

Hitching has been simplified, the conventional number of hitching parts being reduced to less than half, and chain kinking is eliminated, according to the manufacturer. In addition, old hoist cables can be used as dumping cables, and the drag cable can be replaced without removing the pins. Also the bucket's full-manganese teeth have reversible points.

STERLING BALANCED WHEELBARROWS



All trays have double thickness at corners. Both laps are crimped over a continuous butt-welded reinforcing rod.

No. S-12 Barrow—For Dry Materials

Can Be Equipped with Solid Rubber or Pneumatic Tire Wheel

A COMPLETE LINE OF STERLING WHEELBARROWS AND CONCRETE CARTS

STERLING WHEELBARROW CO., MILWAUKEE, WIS.



The man behind the wheel

TWENTY-FOUR hours a day streets and highways are alive with trucks transporting goods vital to the needs of a nation. On the man behind the wheel of this vast fleet rests a great responsibility. It is his job to keep this stream of commerce moving safely and on schedule to its destination.

- Employees of private enterprise, these drivers

are also public servants in the truest sense. We prize their good-will. We are proud to be their co-workers in a great public service. And, valuing their sound judgment of trucking equipment, we try to build the kind of trucks they want.

- We pay our respects to these men—as they so often pay their respects to the trucks we build.



F O R D M O T O R C O M P A N Y

Financing, Equipment For Mich. County Roads

(Continued from page 1)

maintenance of shoulders, crack filling, and replacement of traffic signs, as well as snow plowing and ice control.

Organization and Finances

The county road consists of:

Earth	355.04 miles	Retread	5.48 miles
Gravel	729.80 miles	Pre-mix	5.94 miles
Oil mix	299.94 miles	Sheet asphalt	25.19 miles
Concrete	7.11 miles		

Work is now most active on the oil mix or oil aggregate roads, increasing the mileage considerably each year.

The organization of the Jackson County Highway Department consists of a Board of Highway Commissioners appointed for six-year terms, one each two years, by the annually elected Board of Supervisors. The three districts represented by the Commissioners are of about equal mileage and each has two district garages for the storage of trucks, mowing machines and other equipment. Some of the district equipment is kept in the Central Garage as it is nearer to the scene of activity of that particular equipment than any of the district garages. This is because the county seat, Jackson, is at the geographical center of the county.

Michigan is one of the few enlightened states where the electorate has made itself heard above the clamor of the politicians and reserves every cent of income from weight taxes and gasoline taxes on motor vehicles for the use of the public highways. The county highway funds come from these sources. The weight tax as well as the gas tax money is distributed in a manner aimed to give the larger counties a fair return for their greater needs without penalizing the more sparsely populated counties where tax returns are small but which are in greater need, proportionately, of money for highway work.

Seven-eighths of the first 50 per cent of the weight tax received by the state is returned to the counties on the basis of receipts and one-eighth-third of the remaining one-eighth to each county. The second 50 per cent goes back to the counties of origin with the stipulation that it be used first for the payment of highway bonds, then the balance is distributed to cities, towns, villages and unincorporated portions of the counties in accordance with the population at the last Federal census. Under this provision Jackson County Road Commission received in 1939 a total of \$219,771.43 from weight taxes.

The gas tax money is handled somewhat similarly. Fifty per cent of the first \$2,500,000 received by the state is distributed like the first 50 per cent of the weight tax and the same for the second 50 per cent. All income above the \$2,500,000 is reserved for the use of the state highway department. Under this provision in 1939 the income of Jackson County Road Commission was \$82,546.17.

For several years the county had a 1/4-mill real estate tax which was earmarked for relief labor to be used by the county highway department.

The contract with the state highway department for the maintenance of state trunk lines is carried under a budget figure dictated by the state to cover all maintenance and snow removal. Emergency appropriations have been made in the past by the state legislature to cover excessive snow and ice problems. The contracts with the state are based on the cost to the county and are not profit-making enterprises. The county must furnish to the state each month its pay roll on state work with an equipment rental list based on the rentals set up by the state. The work is done

subject to state inspection and approval.

Central and District Garages

The Central Garage in Jackson is located on Ganson Street, one of the main thoroughfares, adjacent to the fair grounds. The 2-story brick building measuring 60 x 150 feet houses the offices of the County Engineer and his assistant as well as the entire equipment storage and maintenance facilities.

On the first floor is the County Engineer's office with a waiting room. Immediately adjacent to this is the repair shop equipped with a lathe, drill press, a special press for removing and replacing gears, a power hack saw, grind stone, forge, battery charger, and I-beam tracks overhead for the chain hoists to aid in the removal of truck engines and other heavy parts. All the tools for this work are the property of the county, except for some minor pet tools of the mechanics which they are permitted to use. Cabinets with locks are provided for the storage of all tools when not in use.

Immediately behind this repair shop are other separate shops for parking the heavy trucks, the parts room, stock and tools storage. Another separate shed houses stores of calcium chloride and sodium chloride for ice control.

On the second floor is the WPA office for county projects, the Assistant County Engineer's office, a drafting room, and the testing laboratory. Behind these are eight lines of storage space with metal drip pans for light trucks. In this space also are large bins for the storage of the heavier parts needed for the large equipment and next a locked stock room for tires, rope, spare engines, rebuilt motors, skid chains and the like.

The sign shop is the scene of constant activity the year round. Two men are employed at all times, aided as required by emergencies. It is aimed to maintain a store of all signs needed for county and state highways which differ considerably. The metal signs are refinished when the paint is worn and reflector buttons are replaced when damaged. A novel testing device is used on all reflector signs to see that they are in perfect condition before being placed in stock. An automobile headlight is mounted at eye level with a hood over it and a slot through which the inspector views the sign mounted on an easel some 50 feet distant. Poor buttons show up at once and are replaced.

Wood signs of standard character are roughed in from stencils and then hand painted, but special signs are sketched in by a regular sign painter and then painted. The racks about the walls are all marked with the names and types of signs so that there is no delay in loading the right signs.

The storage yard contains the usual stock of culvert pipe, both metal and concrete, small amounts of aggregates, and the snow plows and road rollers. A 15,000-gallon gasoline storage tank permits the purchase of gasoline by the tank car and then it is distributed by

the county truck to the dispensing pumps at the various district garages. Two 10,000-gallon road-oil tanks are mounted in the yard and are really two old tank cars without the flat and trucks.

An open shed in the yard has a full selection of spare blades for both graders and snow plows.

Three of the district garages are built of face brick and three of wood. They average about 40 x 60 feet in plan for the brick buildings and 30 x 50 feet for the wood.

Equipment

The county truck and other equipment, exclusive of snow plows which are listed under the discussion of snow removal and ice control, consists of: 77 trucks of 1 1/2-ton capacity; 18 trucks of 3-ton capacity; 2 5-ton trucks for the South Bend asphalt distributors; 3 motor patrol graders; 4 panel trucks; 3 automobiles; 1 Warco and 1 other light motor grader; 4 pick-up trucks; 2 Allis-Chalmers Model K tractors; 1 Allis-Chalmers Model L tractor; 1 Caterpillar Forty tractor; 1 Sullivan portable air compressor; 1 Fruehauf 15-ton equipment trailer; 1 10-ton supplementary equipment trailer made in the county shops; 1 Bay City 1/2-yard crane; 1 Bay City 1/2-yard shovel and special trailer; 3 complete crushing and screening plants assembled from various makes of crushers, conveyors and screens; 3 pulled graders with 10-foot blades; 2 motor-driven chip spreaders; 2 sanders with traction drive.

Snow Plowing and Ice Control

The county has two V plows for the two distributor trucks and also V plows for the motor patrol graders. For the

3-ton trucks there are both V and blade plows. The plows are distributed among the six district garages and the Central Garage, totaling about twenty-five plows. Certain of the trucks at the Central Garage are assigned to the work of plowing the 150 miles of state trunk lines.

(Concluded on next page)



Demand These Features in Your MIXER!

● AUTOMOTIVE-TYPE TRANSMISSION, 30% to 40% more efficient, quieter, longer lived.

● HIGH CARBON MACHINED STEEL DRUM TRACKS, on chilled, ground rollers.

● 55 TO 145 ALIKE IN ALL BUT SIZE—real heavy duty service in light, fast, and discharge trailers with 2 or 4-wheel mounting interchangeable. Jaeger Criss-Cross "Ra"-Mix Drum, Skip Shaker Loader, loaded "Premiere" Discharge—features that have made Jaeger the world's biggest selling line.

3/4" S with Measuring Batch Hopper Mixes 30% to 40% More! log and prices.

Send today for new catalog. THE JAEGER MACHINE CO. 701 Dublin Ave., Columbus, Ohio



MORE VALUE FOR YOUR TIRE DOLLARS



Operators of truck fleets find the regular use of a reliable tire gauge pays them well. Accurate tire pressures mean added tire mileage and freedom from road service calls due to tire trouble. Make sure your servicemen are using precision instruments to see that correct pressures are constantly maintained in your tires.

Here's the first commercial tire gauge made. Its famous Schrader "direct action" mechanism has been assembled with the skill and care of a fine watch... then checked, rechecked and adjusted to split-hair accuracy.

It's rugged—have no fear of that. And the unique recalibration service that is part of our guarantee assures you of years of dependable service.

Schrader
TIRE
PRESSURE GAUGES

A. SCHRADER'S SON Division of Scovill Manufacturing Company, Incorporated

BROOKLYN, N.Y.

WON'T QUIT or cause time out



A Hayward Bucket keeps the job going ahead on scheduled time. It won't quit or cause time out.

The Hayward Company

32-36 Day Street
New York, N.Y.

Hayward Buckets

Jackson County Uses Fast, Light Snow Plows

(Continued from preceding page)

Most of the snow plowing is done with the light trucks using the blade plows and running at about 30 miles per hour. As most of the snow is dry in character and drifts easily, the use of the fast-moving light plows is a great benefit as they throw the snow well beyond the fences where there is the least chance that it will blow back onto the right-of-way. Most of the blade plows are Ross plows, with some Baker and Champion units.

During the snow season there is always one man, and usually more, at the Central Garage to start calling the district men and individual snow plow drivers and their crews whenever there is a storm. The crews are always started out with the storm, not allowing it to get ahead of the light plows if possible. There are seldom any wet snows or heavy sleet storms but there are generally several light sleet storms which require the roads to be well sanded. These are attacked with the light trucks and sanders, loaded from the stockpiles throughout the county. These stockpiles are replenished in the autumn and then as required throughout the winter, and contain 100 pounds of either calcium chloride, or sodium chloride per yard of sand, thoroughly mixed with the material.

WPA Projects Sponsored

During the past year the county has sponsored WPA projects for about 900 workers. These have included graveling, and grading of the old township roads which became a part of the county systems in 1932 by state law, 20 per cent being transferred each year and completed in 1937. About 36 miles of these old township roads were improved last year under these WPA projects. A total of 20 miles of primary county roads have been widened and the ditches improved; 38.6 miles surfaced with oil aggregate; 21 miles of oil aggregate given a seal coat; 8,100 feet of concrete curb installed; 4,500 feet of storm sewer installed; and three reinforced-concrete bridges of 20, 45 and two 30-foot spans erected. The sponsor's share of these projects was \$172,



C. & E. M. Photo
Preliminary mixing on all Jackson County, Mich., oil-aggregate road-mix projects is done with a 2-gang 18-inch disk harrow pulled by a Model L tractor.

982 and the WPA share \$399,349. All the work was done by WPA labor but with county superintendence.

Oil-Aggregate Projects

The greater part of the county road construction and improvement has been with oil aggregate laid by the road-mix method in the past two or three years. Gradually the gravel roads are being improved in this manner, thus conserving the aggregate and reducing the annual maintenance costs. The county feels that it can afford this type of road improvement rather than that which was the policy in 1928. Concrete roads 18 feet wide cost the county \$25,000 a mile while the oil aggregate 22 feet wide costs only \$3,000 a mile.

The method of constructing the oil aggregate roads is of interest. There must be 1,000 yards of loose gravel per mile either from the old road or hauled in before the oil-aggregate work starts. A maximum $\frac{3}{4}$ -inch stone is used. The loose material is wind-rowed to one side and then dried by blading with the motor patrol graders. The material for one half the road is then bladed out to 12 to 15 feet and shot with three applications of 0.5 gallon per square yard of 70 to 80 per cent 100-penetration asphaltic oil. The asphalt is applied by the county's own distributors and the total application for any one road is about 1.5 gallons per square yard.

After each application a 4-gang agricultural disk 18 inches in diameter is pulled through the material to mix thoroughly the asphaltic oil and aggregate. These disks are pulled by the Allis-Chalmers Model L tractor and then the mix is bladed to one side and

back to the center for the second application. This is repeated for the other applications. At the end the material is rolled with a 7-ton tandem roller to "set" the material.

When the work is interrupted at the end of the day or when there is an impending rain storm, the material is quickly put up into a windrow and capped with a novel device that has proved most effective. It was found that when the mix was compressed slightly it shed water more readily and hence could be worked and dried out more quickly after a rain. This led to the development of the "capper" consisting of a pair of metal plates slightly turned up at the forward end and firmly chained together at the top. They are pulled by the patrol grader over the top of the windrow with the blade pressing down on the top so as to compress the surface slightly.

Personnel

E. K. McAllister is County Engineer

of Jackson County, Michigan, with L. A. Parrish as Assistant County Engineer. They have been in the service of the county in these capacities 18 and 16 years respectively.

Pictorial Inspection Trip Provides Look Under Roads

A good way to get first-hand information on Armco drainage products and retaining walls is to take the typical "inspection trip" on which the Armco Drainage Products Association, Middletown, Ohio, takes many visitors who go to Middletown. Since it is not possible for all those interested to take this trip, Armco has available sets of photographs showing scenes that would be shown on just such a trip.

Copies of this pictorial inspection trip may be obtained on request from the manufacturer who will also gladly supply information as to how Armco drainage products or retaining walls can be adapted to a specific requirement.

Dodge Two-Speed Axles Described in Pamphlet

The advantages of the two-speed axles used in Dodge Job-Rated dual-purpose truck models are fully described in a pamphlet recently issued by the Dodge Division, Chrysler Corp., Detroit, Mich., copies of which may be secured direct from that company or from this magazine.

Examples of the types of work on which these trucks are particularly suitable are given, and the construction of the Dodge two-speed axle, the way it operates, and what it will do for the operator are all clearly described in this pamphlet.

GATKE Swinging Frictions For TOUGH JOBS

GATKE Single Cone Moulded Swinging Friction

Below: GATKE Double Cone Moulded Swinging Friction

Another GATKE Achievement is eliminating trouble and saving money for operators.

On heavy stripping and other tough jobs GATKE improved Swinging Frictions are really going to town with—

There is a GATKE Friction Material for every requirement of shovels, drag lines, cranes, hoists, or tractors that will do the job better and last longer.

Whatever your requirements send data on the application for recommendations.

TREMENDOUS POWER — no let down when things get hot.

SMOOTH ACTION—no grabbing or chattering.

LONG WEAR beyond comparison.

There is a GATKE Swinging Friction developed to do your job RIGHT by men who understand your requirements. Just send data on your application for information.



BRAKE BLOCKS: FRICTIONS

GATKE CORPORATION 224 N. La Salle St., CHICAGO, ILL.

Cheap Water Moving NOVO

A Novo Self-primer throwing 40,000 GPH.

HERE'S the performance record of the Novo Model K Self-priming Centrifugal Pumps.—8-months operation without a complaint or pump failure in the field. Millions of gallons of water without a forced shutdown. That's the way to get water moved cheaply.

There's no air seal on the impeller shaft; it's not needed for the impeller is always submerged. They are self-sealed.

Novos are the only self-primers with adjustable wear-plates on both sides of the impeller. That's the reason for the sustained large volume and the fast priming even after months of service.

Another reason why you get cheap water moving!

10 SIZES—1½" to 8"

Send the coupon

NOVO ENGINE CO.
LANSING, MICH.

NOVO ENGINE CO., 214 Porter St., Lansing, Mich.
Send me literature and prices on the NOVO SELF-PRIMING PUMPS
Name _____ Address _____ City _____ State _____



One of the California Division of Highway signs explaining its traffic-stripe marking system to motorists.

Traffic-Line Stripes On California Roads

About 10,000 Miles of Striping Is In Use to Mark Center and Lanes; Double Line Used to Indicate the No-Passing Zones

By T. H. DENNIS, Maintenance Engineer, California Division of Highways

TRAFFIC-LINE markings to designate the center of the pavements, lanes and no-passing zones have been used in California for several years, and at the present time approximately 10,000 miles of striping is in place and being maintained.

One of the laws passed by the Legislature and which took effect September 19, 1939, requires that the State Department of Public Works determine a distinctive roadway marking which will indicate no driving over such a marking. The standard double line is now used for such markings to designate the center of four-lane pavements; to outline divisional and channelization islands; at approaches to divisional islands; at approaches to obstructions such as the center piers of bridges; and non-passing zones of limited visibility on both vertical and horizontal curves.

The locations where such no-passing lines are used must of necessity be very carefully studied and the no-passing indication must be held to the shortest length consistent with the limited visibility. Traffic should be permitted to pass when the visibility and the way are clear and passing may be done with safety.

Types of Markings

On two and three-lane pavements, a solid 4-inch white line is used to define the lanes. On four-lane and multiple-lane pavements, a 4-inch white line marks the lanes while a double (or triple) line formed by two 3-inch white

lines separated by a 3-inch black line, or its equivalent of black pavement, is used to designate the center of the traveled way.

On divided highways where a curbed island is not constructed, the divisional island is formed by two double lines, as described above, with or without raised arrows composed of emulsion and screenings or plant-mix bituminous materials constructed within the area enclosed by the double lines.

No-Passing Zones

At the crests of grades where the visibility is limited, depending upon the designed speed of the highway, no-passing zones are designated by the standard double line as follows:

1. On two-lane pavements, the double line is painted the full length of the limited visibility of traffic in both directions. Signs having reflectorized white letters on a black background, reading

NO PASSING
OVER
DOUBLE LINE

are placed approximately 400 feet in advance of the beginning of the zone at each end.

2. At the crest or the point where the visibility becomes adequate for the designed speed, one of the lines forming the double stripe is painted yellow. When such a yellow line is in the lane of the driver, it is permissible to pass over the double line if the way is clear. Plain type signs, black on white and reading

PASSING
PERMITTED
IF YELLOW LINE
IN YOUR LANE

are placed at the point where the yellow line begins in the lane of the driver reading the sign.

3. On three-lane pavements, non-passing zones at the crest of grades are designated by painting a double line to form a one lane up—two lane down indication. Whether the two lanes should be on the up or down grade has brought about much discussion. California has striped these zones on the theory that traffic proceeding up grade has limited visibility and should be restricted to no passing.

A transition from the left lane line to the beginning of the restrictive striping on the right lane line, consisting of a 4-foot dashed line, is used. These transitions inform the driver approaching a no-passing zone to move over to the right lane. The driver leaving the zone should not be prevented from crossing the transition line.

The solid painted stripes for lane lines and no-passing designations are used in preference to a broken or dashed line. While there may be a saving in

traffic lacquer, the economy should be in favor of obtaining the most definite indication possible in the interest of safety and orderly movement of traffic. A broken line may, upon investigation, be a solid line changed in appearance by many causes, such as patching of the pavement, bleeding of crack filler, or the shadows of trees.

Determining Visibility

In determining the points of limited visibility, the designed speed of the route is first determined. Minimum passing sight distances are based on three seconds perception time, passing one vehicle traveling 10 miles an hour less than the assumed designed speed of the highway by accelerating from the overtaken vehicle in the face of opposing

traffic traveling at the assumed designed speed, and a line of sight from the eyes of the driver to the top of a vehicle, both 4.5 feet above the pavement surface.

The no-passing zone for traffic in one direction may overlap a no-passing zone for traffic in the opposite direction, or there may be a gap between the end of the zones.

When the visibility ahead is unrestricted, vehicles are permitted to pass over the striping which is formed by a 3-inch white line and a 3-inch yellow line, the yellow line being painted to the right of the white line and in the driver's lane.

In locations between no-passing zones, where traffic in both directions has clear visibility, the standard 4-inch white lane stripe is used instead of a double line.

GIANT-size pile driving jobs shrink to pigmy proportions when

UNION PILE HAMMERS

tackle them!

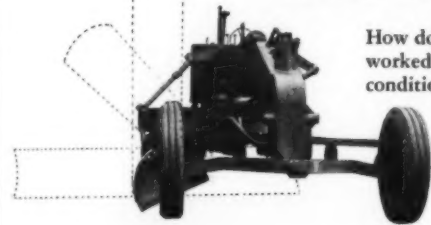
Interchangeable base equipment on all UNION Hammers makes it easy to drive any size steel pipe or fluted casing for concrete piling.

For the latest in Pile Driving Equipment, consult the NEW UNION Booklet No. 184—JUST OUT.

UNION
IRON WORKS, INC.
P.O. Box 18, Elizabeth, N.J.



WE KNOW THIS BLADE WILL DO THE WORK



How do we know it you may ask. We have worked these Galion graders under every condition on our own proving grounds...

we have seen them in operation in the field and we are getting letters every day telling us that the blade on Galion No. 101 and 201 motor graders will go into every position with ease and at will.

This full reversible blade permits adjustment to every angle... for flat-bottom ditching, forming V-shaped ditches, trimming shoulders, bank cutting, and for working in reverse gear when necessary. One man can do all the work. Let us tell you more about Galion graders and what they can do for you in real blading work on your next job.

The Galion Iron Works & Mfg. Co.
Galion - - - - - Ohio

No. 201 motor grader (right) in bank-cutting position. Can be equipped with 50 HP diesel or 40 HP gasoline engine—single or double drive. Bulletin No. 254. Also write for Bulletin No. 253 which covers the No. 101 unit with 60½ HP diesel or 64 HP gasoline engine.

Motor graders
Pull graders
Rollers
Spreaders
Blades



The Littleford Bituminous Resurfacer is the most modern unit ever designed for the application of "mixed-in-place" road surfaces. Powered by truck or tractor,

this Resurfacer will mix and level off from 5 to 6 miles of road surface in 6 hours. Floating plows ride on the old surface thoroughly mixing the aggregate and bitumen. The Bituminous Resurfacer will mix and level off up to 3 inches of compacted surface. Here's the money saving, modern road resurfacer. Write for details.



485 E. Pearl St., CINCINNATI, OHIO



A total of 500,000 cubic yards of dirt will be moved in realigning the Roosevelt Highway north of Malibu Beach, Calif. Here is one of the large fleet of Ford V-8 trucks owned by the contractor, John Strohn & Son of Pomona, receiving its load of dirt from a Northwest shovel.

Weighing Made Easier By New F-M Scale Beam

The new full-capacity beam for motor truck scales, recently announced by Fairbanks, Morse & Co., 600 So. Michigan Ave., Chicago, Ill., is claimed to make accurate weighing of motor trucks faster and easier than ever before. This new beam is available with or without a tare-bar. All working parts are scientifically heat-treated to insure precision fit and continued accuracy. The entire beam, except the aluminum face plates, is finished in slate-gray durable crackle enamel.

All graduated face plates are set at an angle of 45 degrees which permits a tall or a short person to read from a natural standing position. All poises are center indicating of the open-face type. The main poise and the main tare poise have stainless steel roller bearings which run a machined track, and both are equipped with positive-seating stainless-steel poise dogs located in the center of the poises and operating in a vertical plane from convenient side handles. These dogs engage in 90-degree notches accurately machined on the underside of the beams. When the beam is balanced, it is read easily because the decimal reading face plates on this new Fairbanks beam reduce mental calculation to a minimum.

Tarmac Construction Steps

In a new booklet entitled "Construction and Maintenance With Tarmac," Koppers Co., Tar & Chemical Div., Pittsburgh, Penna., gives step by step procedure for constructing and patch-

ing various types of bituminous roads. A few of the subjects covered are: prime coating with Tarmac P, Tarmac mulch treatments, penetration construction with Tarmac, soil stabilization with Tarmac, retreadings and seal coats on bituminous surfaces, and

many others. Also included is a page of "Do's and Don'ts" in using this product.

Copies of this booklet, Form T-2, may be secured direct from the manufacturer by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

For greater dragline yardage use a Page Bucket on the job!



Dragline buckets for all types of work • Capacities $\frac{1}{2}$ to 15 cubic yards

There's a reason why more Page Dragline Buckets are used than any other make. By their yardage records on all types of work, Page Buckets have established a reputation of being able to outdig

other buckets of equal size and weight. Get the greatest yardage possible from your dragline machine—dig with a Page Automatic Bucket! See your equipment dealer or write us for more information.

PAGE ENGINEERING COMPANY
Page Automatic Dragline Buckets • Page Walking Dragline Machines
CLEARING POST OFFICE, CHICAGO, ILLINOIS

Gas-Electric Units

For Job Power Needs

The new Master Big 3 gas-electric power units, recently announced by the Master Vibrator Co., Dayton, Ohio, are designed to provide light weight, portability and sufficient electric power for emergency work and for power requirements on construction jobs.

Model 500 of 500-watt capacity and Model 1000 of 1,000-watt capacity both will generate 110 volts direct current for lighting, operate all Master high-speed equipment and in addition can be used for concrete vibration. Both models are powered with Briggs & Stratton engines, a 1-hp unit being used in Model 500 and a 3-hp engine in Model 1000. The smaller model is mounted on a non-creep metal base equipped with a carrying handle, connection box and pilot light receptacle. The larger model is similarly mounted and the base is drilled for mounting on a wheelbarrow attachment.

Additional features of the Master Big 3, as well as details on the Lite Chief Model 650 or 1250 unit with power take-off, are contained in a new bulletin, copies of which may be secured by those interested direct from the manufacturer or from this magazine.

New Electric Hammer

The Thor-Nado, a portable electric hammer made by the Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill., is adapted to a wide variety of heavy-duty applications, including star drilling, channeling, chipping, cleaning, scaling, cutting, caulking and seaming, and has a capacity in concrete, limestone or brick of 1 inch.

The feature of the Thor-Nado is its patented "slingshot drive," a method of driving the piston in a hammer action by means of a shock-proof rubber connection. This drive whips the piston back and forth at a speed of 1,600 blows per minute, acting as both a power accumulator and a shock absorber. There is no metal connection between the piston and the gear train and motor, and the blow of the piston is not felt by the operator nor is it transmitted to the gear or motor.

The specially designed universal-type motor is housed at right angles to the piston barrel and transmits power through heavy-duty helical cut gears. Ventilation is of the patented Thor tangential type. The Thor-Nado is easy to dismantle for cleaning and inspection, and inspection covers are provided for the brushes.

Copies of Circular No. E-32 containing further information on the Thor-Nado may be secured direct from the manufacturer by mentioning this item.

3 LEADERS CO-OPERATE in building modern bridges

Write for Literature
ROGERS BROS. CORP.
108 Orchard St. Albion, Pa.

KNOWLEDGE possessed by the Van Haarens and facilities afforded by their Rogers Trailers permit the Mahon organization to fabricate large girders at their local plant and haul them to points distant from Detroit.

A majority of the better movers throughout the country and in several foreign lands depend upon Rogers Trailers for their heavy and unusual operations. You, too, will find in them a combination of the practical features that assure profitable operation.



EXPERIENCE built it

PERFORMANCE sold it

"Best Maintenance Tool We Have!"

Franklin County, Iowa, is proud of its Michigan Truck Shovels and Cranes... proud of their production and economy records! But read their letter... typical of the praise earned by convertible MICHIGAN Truck Shovels, Cranes, Clams, Draglines and Trench Hoes in both public and private service everywhere.

C-90



OFFICE OF
FRANKLIN COUNTY
BOARD OF SUPERVISORS
HARTFORD, IOWA
May 15, 1940

The Michigan Power Shovel Company
Benton Harbor, Michigan

Attention: Mr. D. H. Ross

Gentlemen:

Your distributors in Iowa, The Waterloo Construction Company of Waterloo, Iowa, have asked us to write you regarding our experience with your Michigan truck mounted draglines.

We have used your machine extensively for maintenance work and have never measured the yardage moved, therefore we cannot give you the stripping gravel pits, stock piling gravel from water, pile driving, and placing large diameter concrete pipe, filling baffle walls, load-lug gravel trucks, filling bridges and miscellaneous small jobs of about every description, that we used to get off and try not to use, because we did not have suitable, economical equipment to do the work.

This is the second full year we have used this dragline, operating it more than 2000 hours in 1939 and more than 2600 hours in 1940. Our operating cost per hour, including operator, have been very satisfactory; low, gas consumption running between 15 and 18 gallons per hour; day; oil, grease, alcohol, repairs, etc., in line satisfactory.

We keep a map on which we spot jobs for the dragline as they come up. We have never been able in two years to complete all the jobs and we wonder how we ever got along without it. This is evidenced by the fact that last November we purchased our second Michigan dragline, just like the first one.

Yours very truly,
FRANKLIN COUNTY BOARD OF SUPERVISORS
Dana B. Hendricks
Chairman

MICHIGAN POWER SHOVEL CO. BENTON HARBOR, MICHIGAN, U.S.A.

Use of Subgrade Felt For Concrete Paving

Loss of Water in Concrete Prevented By Use of Waterproof Membrane Between Subgrade and Concrete; Now Specified in Number of States

THE use of a waterproof membrane between earth subgrade and concrete in concrete pavements was first introduced in western Iowa along the Missouri River where there is a deposit of a wind-blown soil known as loess. This soil, which may be found along the eastern banks of the Missouri and the Mississippi River has several unique characteristics, among which are fineness, the ability to stand better in vertical position than on a slope, and the ability to absorb moisture very rapidly.

In the early 1920's, when concrete pavement construction began to be a factor in this locality, it was discovered that new concrete laid on this loess showed a tendency to crack within three or four hours from the time of placement. These cracks extended through the concrete and were spaced at intervals of only 3 or 4 inches. The trouble appeared to be caused by loss of water in the subgrade. The elimination of this condition by placing a waterproof membrane between the subgrade and the fresh concrete was adopted as suggested by Roy W. Crum, then Testing Engineer for the State of Iowa, and now Director of the Highway Research Board. This procedure was found to be successful.

Later it was discovered that absorption of water by the subgrade occurred in varying degrees on most types of soil, that this condition is not entirely overcome by sprinkling the subgrade previous to pouring the concrete, and that the use of a waterproof membrane under all concrete slabs might be justified. Since that time the practice has been accepted in Iowa, Kentucky, Missouri, and the District of Columbia which specify this type of construction on concrete paving projects, and about a dozen other states, including Minnesota and Ohio, require it on special types of soil.

At first a cheap grade of roofing material was used, later a tar paper called slaters' felt was used, and this was followed by the now standard subgrade felt made especially for this purpose. Both the practice and the material are approved by the Public Roads Administration and the American Association of State Highway Officials which has lately adopted a specification for the material and practice.

Advantages

Since the advent of vibration for concrete, drier mixes are being used. This means that the loss of even a very little water from the mix during the first hour or so after placing has a decided and detrimental effect on the finishing quality of the new concrete. The use of subgrade felt keeps the water in the fresh concrete.

Another advantage of the use of subgrade felt is that it provides a clean dry surface for the workmen so that there is no chance of fresh earth being tracked into the new concrete and no chance of earth becoming mixed with the concrete during the pouring and puddling operations.

It also happens that in most states there exists a large variety of soils, most of which will absorb water from fresh concrete, but at a different rate and in varying amounts. This inevitably affects the strength of the slab, with the result that the concrete, often on different sections of one project, will show a variation in strength. While it might be possible to treat subgrades so that they would all absorb moisture at the

same rate and in the same amounts, this would be a costly procedure, and the use of subgrade felt provides a more economical means of achieving the same purpose.

Due to the fact that the use of paper tends to give a more uniform water content, it is natural that the riding surface should be affected. A mid-west state highway construction engineer points out that wet and dry spots in the concrete make rough spots in the riding surface and that the use of paper eliminates most of this.

Actually, it is stated, the use of subgrade felt costs the state highway departments practically nothing. Examination of a core of concrete pavement laid on an earth subgrade shows the bottom of the core covered with countless points where the concrete has penetrated into small holes and depressions in the subgrade. These holes are from 1/4-inch in diameter down to the size of a pencil point, and the loss of concrete for each seems negligible indeed. But it is figured that if as much as an average thickness of 0.06 inch of concrete is saved by the use of subgrade felt, it would amount to 1 per cent of the total concrete in a 6-inch slab, which saving would be more than enough to pay for the subgrade felt required.

Specifications

The specifications for Carey Elastite subgrade felt, given below, conform to Specification M-74-38 of the American Association of State Highway Officials. These specifications are:

Subgrade felt shall consist of a base of kraft, mixed kraft and felted stock, or felted stock, uniformly saturated with asphalt and conforming in quality, size and packaging to the following requirements.

(a) *Dimensions.* Diameter of roll 8 inches maximum. Width of felt 60 inches maximum; 36 inches minimum. Quantity in roll 1,000 square feet.

(b) *Weight.* The weight of the impregnated felt per 1,000 square feet shall not be less than 40 lb.

(c) *Evaporation Loss.* When heated for one hour at 163° C. (325° F.) the felt shall lose not more than 7 1/2 per cent of the original weight of the sample.

(d) *Per Cent of Saturant.* The amount of saturant contained in the felt shall be not less than 50 per cent of the weight of the dry or untreated felt.

(e) *Pliability.* The felt shall withstand being drawn forth and back three times while bent through an angle of 180° around a mandrel 3/32 inches in diameter and while maintained at a temperature between 70° and 80° F. without cracking or breaking.

(f) *Strength.* The impregnated felt shall meet the following strength requirements when tested at laboratory air temperature between 70° and 80° F.

(1) *Bursting Strength.* The sample of felt shall show a bursting strength of not less than 40 lbs. when dry and 20 lbs. when tested immediately after immersion for one hour in water at 70° to 80° F.

(2) *Tensile Strength.* The tensile strength per inch of width of felt shall not be less than the following:

In the Machine Direction...45 lb.
In the Cross Direction...25 lb.



**Complete Line
of
DERRICKS
and
WINCHES**

SASGEN DERRICK CO.
3101 W. Grand Ave. Chicago, Ill.

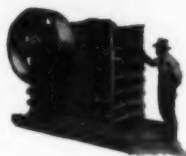
(g) *Sampling and Testing.* One sample shall be taken to represent each lot of 200 rolls or less. The roll from which the sample is taken shall be selected at random. The first 6 feet of the roll selected shall be discarded. The sample for testing shall be a strip of the full width of the roll not less than 36 inches long with both ends cut squarely across the strip. This strip of felt together with other samples representing the carload or lot shall be rolled tightly without folding or wrinkling the felt and forwarded to the state highway testing laboratory.

Rock Drill Co. Opens Offices

Announcement has been made by the Cleveland Rock Drill Co., Cleveland, Ohio, of the appointment of Clarence L. Seaman as District Manager of its new branch office in Berkeley, Calif. This company has also opened a branch office, with service and supplies, at Wallace, Idaho, with Clarence F. Zeuch in charge.

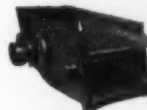
The New York Office of the Cleveland Rock Drill Co. recently moved to 30 Church St., New York City. Sam McCart is District Manager.

Crushing Equipment



AUSTIN-WESTERN

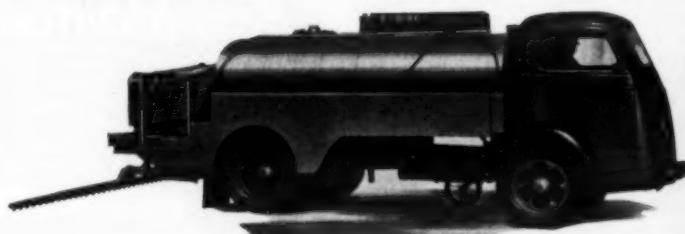
A-W's complete line of crushing, screening and gravel washing machines permits the selection of the equipment best suited to any requirements. A-W Portable Units combine capacity, compactness and easy, fast portability. Built with over-size shafts and roller bearings, A-W Crushers have a world-wide reputation for low operating cost, big output and trouble-free operation at remote locations.



THE AUSTIN-WESTERN ROAD MACHINERY CO.,
Aurora, Illinois

SIX STYLES...

10 TANK SIZES ★ 3 DIFFERENT ENGINES



GET WHAT YOU NEED FROM ETNYRE

... and get prompt delivery (a week on popular sizes)! Here, from one source, you can order the exact size and style "Black Topper" required... with just the equipment you want... complete with all Etnyre's exclusive features for accuracy, efficiency, economy, convenience of operation and dependability. See your nearest Etnyre dealer or write today for FREE "Foto-Facts" pictorial catalog and price list. Act now! E. D. Etnyre & Co., Oregon, Illinois, U.S.A.

ETNYRE

BLACK TOPPER

ROAD BUILDING SYSTEM

Mississippi Improves Roadsides on Route 6

(Continued from page 23)

of the project. This item plays a large part in the prevention of erosion and the preservation of natural roadside vegetation. Spillways of rock masonry were constructed on all outlet ditches exposed to erosion, and were also placed at any area where erosion could not be controlled by solid sod.

Tree wells were placed around nine specimen trees within the new fill limits. The rock masonry on the project is ornamental as well as serviceable. The stones were laid with cement by a skilled stone mason, with the assistance of several helpers. About 5 or 6 cubic yards a day was laid.

Among the last items to be completed was the rustic-type wooden guard rail which was constructed of native red cedar rails and posts in sections on each side of the road along the fills with 2:1 slopes. The posts were allowed to soak in a creosote oil solution before being placed in the ground, then the rails which were approximately 8½ feet in length were jointed at each post, then secured by a steel drift pin ¾ inch x 18 inches and driven in a bored hole through the jointed rails in each post. The end posts of each section consisted of a rubble masonry pillar constructed of the same native stone used for the other structures on the project, each containing approximately 1¾ cubic yards. Two coats of Cabot's brown shingle stain were applied to the rails which harmonize perfectly with the color of the stone end posts.

Contractor's Contribution to Job

Winston & Griffith of Dallas, Texas, contractor for this project, received both the Southern Section and National Awards in the 1939 CONTRACTORS AND ENGINEERS MONTHLY Roadside Development Awards for highway contractors, because of their outstanding contribution to roadside development. Although the Awards were made for their excellent cooperation and contribution on an erosion-control project in Texas, particularly for the development of two pieces of equipment for cutting and handling sod, the Mississippi State Highway Department also nominated this firm for the Awards, because of its excellent work and contribution to roadside development on this project.

In the laying out and construction of the project, it was found necessary to work out many of the construction details in the field, and the Mississippi state highway engineers report that the contractor took an active interest in working out these details to the best advantage of the project, even though in some cases it was not to his personal advantage.

An example of the contractor's cooperation is found in the handling of the top soil. A top-soil pit for the project had been indicated on the plans, located off the right-of-way. Upon investigation it was found that the soil which could be obtained from this pit was not entirely satisfactory. The contractor

suggested that a much better grade of top soil could be found on the right-of-way by saving the stripping from the cut sections and using the soil excavated from the bottom of the drainage ditches. This procedure necessitated handling some of the top soil twice, but provided a much more satisfactory soil for the project.

Another contribution made by the contractor on this project was the sod-cutting machine. This unit, developed by J. C. Griffith, one of the partners of Winston & Griffith, speeds up the sod-cutting operation and in addition turns out sod which is uniform in size and depth, which in turn considerably speeds up laying of solid sod as well as giving much better than ordinary results.

N. J. Griffith was Superintendent for Winston & Griffith on this project which was under the direction of W. J. Wiggins, Project Engineer for the state. Dudley Collins Jr. is Roadside Improvement Engineer for the Mississippi State Highway Department.

New Road Maintainer For Truck Mounting

The new Johnson road maintainer, made by the Maintenance Equipment Corp., Fowler, Ind., is a push-type main-

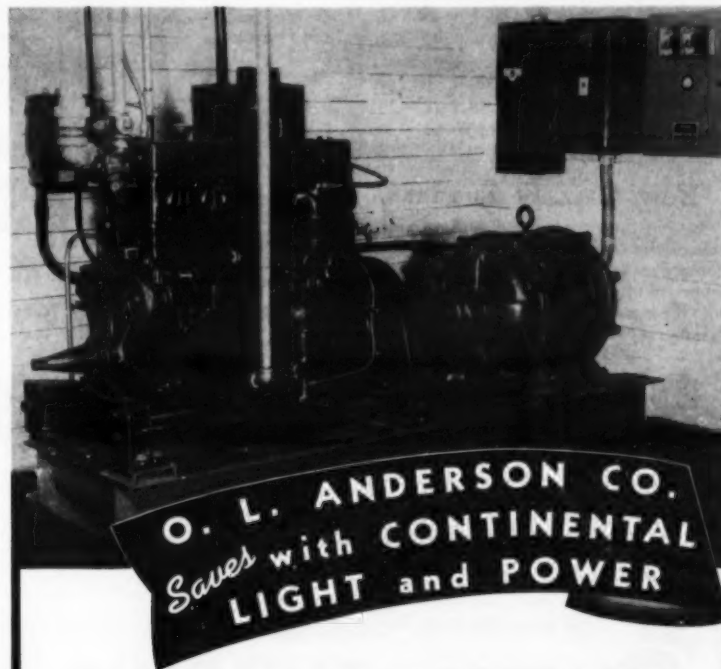
tainer mounted on the front of a truck in 5 minutes by using any standard snow plow mounting. There is no side draft on the truck and the maintainer is always in view.

Other new features claimed for this maintainer are its hydraulic one-man control with a gradual lift for effecting safe easy crossings of bridges and railroad tracks; a hydraulic vertical movement which controls the amount of material carried by the blades, permitting light or heavy cuts; a level finish assured by the truck wheels traveling on a smooth graded surface; and an adjustable spreader blade which eliminates windrows by spreading excess material.

These features are described and illustrated in a 4-page bulletin, copies of which may be secured by interested state and county highway engineers direct from the manufacturer by mentioning this magazine.

2-Wheel Hydraulic Scraper

The Gar Wood-Continental two-wheel hydraulic scrapers are available in models with capacities of 3, 5, 6, 8 and 10 yards. They are designed to be pulled by tractors ranging in size from the Allis-Chalmers Model M to the A-C Model HD-14 or by other makes of tractors of comparable power.



Continental Red Seal Engines

are furnished in a variety of sizes to fit many diversified power requirements, and are supplied with the proper combination of standard accessories to fit each individual application.

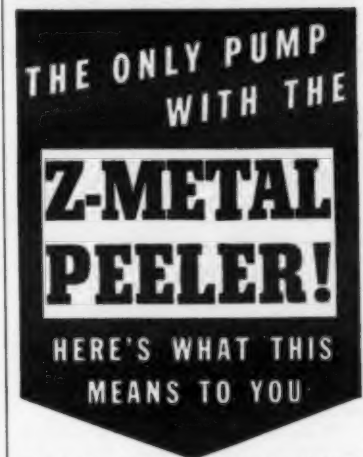
O. L. Anderson Co., Inc., Detroit, Michigan, makers of Sheet Metal Parts for motor cars, utilizes a Continental Model "R" for its daily demands for light and power. This dependable "Red Seal" engine is direct connected to generator and the fuel consumption is only 16 cu. ft. of gas per KWH.

Continental Red Seal Light and Power Plants are for direct current, single phase and three phase alternating current. They are built under two classifications: Slow Speed—Heavy Duty and High Speed—Intermittent types.

Let us solve your light and power problems so you can enjoy the recognized Continental Combination of Economy and Dependability. Whether you require a small plant or 100 KW capacity, send full information and, without any obligation, we will be glad to submit sound recommendations.

Continental Motors Corporation
MUSKEGON, MICHIGAN

These scrapers are described and illustrated with full specifications and particulars in bulletins. Copies of these and the name and location of the nearest dealer may be secured by interested contractors and state and county engineers direct from Gar Wood Industries, Inc., Road Machinery Div., Detroit, Mich.



Standard equipment on all Rex Speed Prime pumps is the Z-Metal Peeler—a sharp-edged casting of corrosion and wear-resistant Z-Metal which removes the air from the impeller, prevents air from rotating around the impeller when the pump is priming, or when the suction line is leaking air. The Peeler gives Rex Speed Prime pumps more air-removing ability than any other good contractor's pump. It enables them to prime faster, hold their prime longer—day in, day out—year in, year out!

Z-METAL IMPELLER, TOO!

The unique Rex impeller, which retains its ability to prime after long years of wear, is made from Rex Z-Metal—an exclusive Rex Speed Prime feature. Z-Metal's strength, toughness and ability to resist abrasion are far greater than malleable iron or semi-steel found in ordinary contractor's pumps. Thus, internal losses are less in your Rex Speed Prime pump. High efficiency is maintained over longer periods of hard work.



Here is the brief, concise story of the superiority of Rex Speed Prime pumps! Be sure you've read it before you buy any pump! Send for your copy. Ask for Bulletin No. 363. Chain Belt Company, Dept. P-9, 1666 W. Bruce Street, Milwaukee, Wisconsin.

BUY REX AND BE RIGHT! PUMPS

Change of Address

(Mail to Contractors and Engineers Monthly, 470 4th Ave., New York, today)

From.....
(Old address)

To.....
(New address)

Name.....

LIGHT PLANTS 110 AC ANYWHERE WITH KATOLIGHT

For operating compressors, portable floodlights, electric saws, drills, camp radios, and lights, etc.

Also 6 and 12-volt battery chargers for charging batteries without removing from car, truck or tractor.



\$69.00 Upwards
KATOLIGHT
100 Elm Street
Mankato, Minnesota

Proper Lubrication Increases Machine Life

(Continued from page 29)

service, the oil is kept sufficiently fluid by means of the heated air in the valve chest.

Electric Motor

The electric motor is applicable in construction service where external electric power is available. Proper motor lubrication requires a knowledge of bearing construction, and it must be positive and dependable, for any failure may lead to the possibility of the rotor's coming in contact with the pole pieces, causing burn-out and shut-down of the machine. The electric motor is a comparatively delicate mechanism, as its bearings have but a limited capacity for lubricant, so there is but little reserve in case of trouble. Regular inspection and re-lubrication are therefore most advisable.

Motor bearings are of the sleeve type or ball or roller design. The former are usually equipped with ring oilers; the latter for pressure grease lubrication. A straight mineral highly refined oil of from 150-300 seconds Saybolt at 100 degrees F., or in other words an oil within the S.A.E. 10 to 20 range, is usually required for ring oilers. The pour test should be as low as possible, especially where the machine is started and operated at comparatively low temperatures. Little heat is developed in a ring oiled bearing. Therefore the oil must not congeal or become too sluggish at low temperatures; otherwise the rings might not be able to bring about complete circulation.

Selecting Greases

Greases for construction machinery should be selected quite as carefully as similar lubricants for automotive equipment. This practice has been aided by the adaptability of pressure lubrication and the positive results to be obtained from the hand or power-type grease gun. In ball or roller bearings, grease lubrication is most prevalent, due to its sealing properties against the entry of dust, dirt and moisture.

The requirements for a grease for normal bearing service are not so exacting as in the case of engine and compressor oils. On the other hand, one should not go to the other extreme, assuming that any cheap grease will do. Instead, study should be given to the essential characteristics of a grease, such as its melting point, consistency, and the nature of the soap from which it has been made, to determine its adaptability to operating conditions.

Gear Lubrication

Reduction gears in construction equipment are often exposed or inadequately housed. While the advantages of proper housing are fully realized, it frequently can not be applied. Under such conditions, lubricants must be chosen with due consideration of this limitation, and the possibility of mixture with abrasive dust and dirt.

Pressure also affects the performance of a gear lubricant. As a general rule, tooth pressures are comparatively high. The more accurately the gears have been cut, the more intense will be the pressure, inasmuch as the area of contact is reduced. This pressure is constantly changing as the teeth mesh with each other. Consequently the direction of application of the load also changes. This may tend to accelerate the rate of sliding motion, especially if lubrication is inadequate. Under such conditions, more or less grinding between the teeth develops.

This is where the gear lubricant should "do its stuff." If it possesses

sufficient oiliness and is of suitable viscosity, its ability to adhere to the teeth and resist the prevailing pressures is more nearly assured.

Gears are normally used at atmospheric temperature. As a result, the possibility of the gear lubricant being reduced in viscosity by abnormal heating is comparatively remote. One is more concerned with the effects which low temperature may have upon a gear lubricant in such service. Unsuitable lubricants have a tendency to congeal, to become brittle and crack. If the lubricant has been properly refined, however, this should not be serious. Straight mineral lubricants are generally best adapted to these operating conditions. The average range in viscosity for service on exposed gears will vary from approximately 500 to 1,000 seconds Saybolt at 210 degrees F., according to climatic conditions.

More fluid lubricants are usually required on enclosed gears, or certain types of chain drives. Most of the latter involve comparatively low clearances between the connecting elements which go to make up the links. Obviously the lubricant must be capable of penetrating to all surfaces of contact between these parts; otherwise abnormal wear may occur. So here it is generally best to use a lubricant of about the same viscosity as a heavy steam cylinder oil, in the neighborhood of 150 to 200 seconds Saybolt at 210 degrees F. It may or may not require compounding, but for a worm gear drive the latter is favored by gear designers. Where a straight mineral oil is applicable, an S.A.E. 90 to 250 product is serviceable.

New Grizzly Feeder

One of the problems of rock production is the feed to the primary crusher. Quarry rock, when fed by gravity, has a tendency to bridge over and may not go into the crusher, or if the hopper is steep all the rocks go into the crusher and

choke it. The new Pioneer traveling grizzly feeder is designed to meet these problems. Its purpose is to feed a steady stream to the primary crusher, handle the large rocks without delay, and to bypass the dirt and small materials around the crusher.

It is said to take long rocks and feed them end first into the crusher opening; it eliminates choking and prevents bridging; if a rock is too large, the feeder is stopped, the rock broken by sledge and the feeder started again with no delay to the crusher; and if there is an excess of dirt in the rock, a screen

can be located below the feeder, the dirt rejected, and the rock delivered into the conveyor with the product from the primary crusher. A clutch with controls on the operator's platform permits accurate control of the feed.

Further details on this Pioneer traveling grizzly feeder may be secured by interested contractors and state and county highway engineers direct from the Pioneer Engineering Works, Inc., 1515 Central Ave., Minneapolis, Minn., by mentioning this item.

Want information? Write the Editor.

WAREHOUSES

BALTIMORE
BOSTON
BUFFALO
CHICAGO
CINCINNATI
CLEVELAND
DETROIT
ERIE
MEMPHIS
NEW YORK
PHILADELPHIA
PITTSBURGH
ST. LOUIS
SAN FRANCISCO

VITALIC
HOSE • BELTING • PACKING
CONTINENTAL RUBBER WORKS • ERIE, PA.



BETTER TRENCHING BUCKETS

are being built...

SPECIAL jobs often require special tools and while Owen Buckets are conceded to be unusually versatile in digging, the trenching buckets not only combine the requisite features of correct principle and powerful digging ability but are equipped with specially designed cutting teeth for most efficient trench work.

AND **OWEN** is BUILDING THEM

The OWEN BUCKET CO. 8825 BREAKWATER AVE. CLEVELAND, OHIO BRANCHES: New York, Philadelphia, Chicago, Berkeley, Calif.



A MOUTHFUL AT EVERY BITE

ASPHALT PLANTS

LEADING CONTRACTORS ARE STEADILY
TURNING TO SIMPLICITY ASPHALT PLANTS
NOT JUST ANOTHER PLANT—AN ECONOMIC NECESSITY



IN ONE WEEK THREE LEADING
CONTRACTORS IN OHIO AND
TEXAS HAVE BOUGHT THEIR FIRST
SIMPLICITY PLANTS—A GROWING
LIST OF PLANT OWNERS TELLS
OUR STORY

THE **SIMPLICITY**
SYSTEM COMPANY

CHATTANOOGA, TENNESSEE



Air Shut-Off Valves**For Tunnel Manifolds**

A new leaflet describing the construction and applications of Homestead-Ross air shut-off valves has recently been issued by Homestead Valve Mfg. Co., Inc., Coraopolis, Penna. These valves are especially useful as quick-operating units on small air, gas, or cold water lines of 1/2 and 3/4-inch diameter. Among the advantages claimed by the manufacturer are positive seating by line pressure and a spring, and positive cam action which holds the lever in open position. They are inexpensive and easily repaired.

Copies of this leaflet may be secured direct from the manufacturer.

New Lubricating Coating

A stable and adherent lubricating coating for use in pre-lubricating surfaces not readily capable of lubrication by ordinary means has been developed and patented by the Acheson Colloids Corp., Port Huron, Mich. This coating is applied in liquid form, either by dipping, brushing or spraying, and hardens on exposure to light, providing a relatively high resistance to abrasion as well as lubrication and corrosion-prevention characteristics, according to the producer.

The basic element providing the lubrication is colloidal graphite while the presence of small amounts of hardenable organic colloids and a hardening agent, in a water suspension, render the composition photo-hardening in character.

The coatings may be applied at normal temperatures or to surfaces heated up to 100 degrees C., to promote rapid drying. The lubricating characteristics are not affected by operation of the surfaces at elevated temperatures.

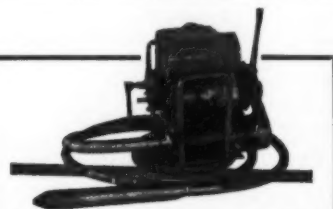
New Small Diesels

A new line of small diesel engines, equipped with the Lanova combustion chamber, and which are claimed to develop more power per cubic displacement and per pound, has recently been announced by the Stover Mfg. & Engine Co., Freeport, Ill.

These new Stover diesels are smooth running and economical to operate. They are available in four sizes and with a variety of mountings. The 7 1/2 and 10-hp models are of the single-cyl-

inder and the 15 and 20-hp models of the twin-cylinder type. The latter have No. 1 bell housing with enclosed fly-wheel.

Stover's Diesel Bulletin No. 51, containing complete information on this new line of diesels, may be secured direct from the manufacturer.

**Concrete VIBRATORS AND GRINDERS**

Write for Circular on types, sizes and prices

White Mfg. Co.
ELKHART INDIANA

BUFFALO-SPRINGFIELD

3-AXLE TANDEM ROLLERS

TANDEM ROLLERS

3-WHEEL ROLLERS

TRENCH ROLLERS

THE BUFFALO-SPRINGFIELD ROLLER CO.
SPRINGFIELD, OHIO

Directory of**EQUIPMENT DISTRIBUTORS**

The following cards (arranged by states) show the names of dealers in contractors' equipment and supplies, with a record of various lines handled.

ARIZONA TRACTOR & EQUIP. CO.

1402 North 19th Ave., P. O. Box 1494,
Phone 3-1146, Phoenix, Ariz.

Representing

AEROL Products
ATECO Dismovers, Bul-
ders, Tamping Rollers,
Scrapers
BROOKVILLE Locomotives
BROS. Bulldozers, Angi-
diers, Snow Plows
BUCHSUS-ERIE Shovels
BUFFALO-SPRINGFIELD
Rollers
CLETRAC Tractors

CLEVELAND Rock Drills
EAGLE Crushers
EMSCO Road Equipment
GARWOOD (Lancaster)
Bulldozers, etc.
KEWANEE Conveyors
SCHRAMM Compressors
SOUTHWEST WELDING
& MFG. CO.
SULLIVAN MACHY. CO.
WHITE & INDIANA Trucks

GARLINGHOUSE BROS.

2416 E. 16th St. Los Angeles, Calif.
Southern California Distributors for

BROWNING—Truck Cranes, Shovels, Locomotive Cranes
CENPETER—Dumpsters
DIAMOND IRON WORKS—Crushers, Portable Gravel
Plants
DAVEY—Compressors
LAMBERT-NATIONAL—Hoists and Cableways
MCKERNAN-TERRY CORP.—Pile Hammers
A. LEBACH & SONS—Wire Rope
NOVO—Engines, Pumps, etc.
OWANA—Dragline Buckets
OWEN—Clamshell Buckets
RANDOM—Concrete Carts, Wheelbarrows, Concrete Hoppers, Buckets, etc.
UNIVERSAL—Panel Forms, Form Clamps, etc.

Manufacturers of

GAR-BRO—Concrete Carts, Wheelbarrows, Concrete Hoppers, Buckets, etc.
GAR-BRO—Dragevay Attachment for Draglines

EDWARD R. BACON CO.

Folsom at 17th St.
San Francisco, Calif.

Aerol Emulsion Distrib. Agents
Allis-Chalmers Tractors
American Concrete Grinders
Brooks Load Lifters
Carnegie Bit Grinders
Cleveland Rock Drills
Crown Shovels, Cranes
Dodge Derrick, Fittings
Erie Rollers
Double Derrick, Fittings
Erie Rollers
Gar-Bro Tractors, Carts
Hercules Chip Shredders
Hercules Power Units
Hough Rollers
Interstate Transways
Jensen Concrete Vibrators
Jensen Mixers, Pumps
Hoists, Paving Equip.
Jones Saw Benches

Kessler Clamshell Buckets
Kessler Lighting Plants
Littlerford Wheelbarrows
McKernan-Terry Pile Hammers
Marion Shovels, Cranes, Draglines
Nelson Bucket Loaders
Ohio Locomotive Cranes
Pace Dragline Buckets
Perts Conveyors
Ramsey Winches
Rogers Bros. Trailers
Safarum Air Compressors
Seymour Concrete Crushers, Vibrating Screens
Teleda Trenches
Ward Pumps
Winslow Scales

Member: Associated Equipment Distributors

NORRIS K. DAVIS, INC.

400 Seventh St. San Francisco, Calif.

Representing
CONSTRUCTION MACHY. CO.—Vander Mixers, Hoists
DAVIS COMPANY—Large Tilling Mixers, 1, 2, 3, and
4-yd., Weigh Batchers, Batching Plants, Manual or
Full Automatic Operation, Ready-Mix Concrete Plants
and Equipment, Motor Truck Concrete Mixers and
Carriers, Electrically Operated and Controlled Water
Meters, Ring Hoppers, etc.
W. E. GRACE MFG. CO.—Road Sweepers
HANSON CLUTCH & MACHY. CO.—Full Revolving
Shovels, Cranes, Draglines, 3, 4, 5, and 6-yd.
LE ROI CO.—Gasoline Power Units and Parts
MASTER VIBRATOR CO.—(Gas, Elec. Generator Sets,
Concrete Vibrators, Power Tools
MINN. STL. & MACHY. CO.—Twin City Engines, parts
NORTHERN CONVEYOR CO.—Stationary & Portable
Conveyors
O. K. CLUTCH & MACHY. CO.—Hoists & Compressors
SNOW REMOVAL EQ. CO.—Blade and Sierra Snow
The EARL WALKER CO. INC.—Hd. Oilers, Walker
Bats

LLEWELLYN MACHY. CORP.

1030 N. Miami Ave., Miami, Florida
Link-Belt Co.
Ames Baldwin Wyoming Co.
Anchor Center Mandy Co.
Atlas Imp. Diesel Eng. Co.
Austin-Western Rd. Mandy Co.
Barber-Greene Co.
Blystone Mfg. Co.
Browning Mfg. Co., Inc.
Climax Engrs. Co.
Century Electric Co.
Coffing Hoist Co.
Columbia Iron Mower Co.
Hercules Dismers & Sons, Inc.
Elkhart Rubber Works
Forest City Bit & Tool Co.
Gallagher & Livingston Co.
Grout Pumps, Inc.
Hercules Motor Corp.
Hewitt Rubber Corp.
Independent Press. Tool Co.
Ingersoll-Rand Co.
Jagor Machine Co.
Ede. & Johnson, Inc.
Leflor Co.
Owen Bucket Co.
Page Engrs. Co.
Penn. Elec. Switch Co.
Pomona Pump Co.
Purcell Cable Mandy Co.
Roberts Filter Mfg. Co.
Sorel, Inc.
Stover Mfg. & Engine Co.
Syracuse Co.
Viking Pump Co.
Wall Rope Works, Inc.
Westinghouse Elec. Supply Co.
Whitehead Bros. Rubber Co.
Wickwire Spenser Steel Co.
Ede. & Johnson, Inc.
Leflor Co.
Wisconsin Motor Co.

McKernan-Terry Corp. (Divisions)
LAMBERT-NATIONAL—Hoists, Cableways
STEEL & CONDUCT—Special Machinery
Wheelbarrows, Hose, Cable Rope, Tarpsaulins,
etc., carried in stock

R. S. ARMSTRONG & BRO. CO.

676 Marietta St. Atlanta, Ga.

New and used equipment Rental-Sale
REPRESENTING
Allis-Chalmers Power Units
Crown Hand Hoist Jacks
Brooks Tamping Rollers
Car Hoppers, Boosters
Bueymer-Erie Cranes, Shovels
Burlch Unloaders, Conveyors
Cable Lights
Chicago Pneumatic Air Compressors
Crescent Universal Saws
Crown Drill Steel
Holtz Curb & Gutter Paving
Forms, Bins, Batches
Jagor Concrete Mixers, Pumps, Paving Machy., Hoists
Jones-Superior Saw Rigs
Le Roi Engines
Master Vibrators
Owen Buckets
Purcell Cable Handways, Sander
Raveling Cable
Roco Distributors
Sagor Derricks, Winches
Traylor Rock Crushers
Union Steam Pile Hammers
Universal Rock Crushers

Member: Associated Equipment Distributors

TRACTOR & MACHINERY CO., INC.

351 Whitehall St., S.W., Atlanta, Ga.

Representing
CHAMPION Rock Crushers
HAISS Clamshell Buckets
JAHN Heavy-Duty Trailers
NORTHWEST Cranes, Shovels and Draglines
NOVO Engines, Pumps and Hoists
RANSOME Concrete Mixers
WORTHINGTON Air Compressors

Member: Associated Equipment Distributors

YANCEY BROTHERS, INC.

634 Whitehall St., S. W. Atlanta, Ga.
American Manganese Jaws
American Cable Wire Rope
Barber-Greene Ditchers, Com-
veyors, Asphalt Equipment
Barrow Pumps
Buffalo-Springfield Rollers
Butler Bins, Batches, Bulk
Cement Plants
"Caterpillar" Tractors, Grad-
ers, Power Units, etc.
Center Blade Crushers
Clyde Hoists
Conveyors, Compressors
Demeter Quarry Skips
Dress Saw Rigs
Ingersoll-Rand Air Compres-
sors, Air Tools
Jackson Vibrators
Kittler Rippers, Harrows,
Drag Scrapers, Plows
Kinney Asphalt Distributors
LaPlant-Choate Bulldozers,
Trailers, etc.
LeTourneau Carry-All Scrap-
ers, Angledozers, Rippers
Metform Road, Sidewalk,
Curb & Gutter Forms
Page Dragline Buckets
Red Edge Shovels
Red Star Wheelbarrows, Con-
crete Carts
Ree Mixers, Pumps, Pavers
Russell Road Plows
Thom-Laine Shovels
Timken Drill Bits & Rods
Ward Road Plows
"Williams" Buckets

F. H. BURLEW COMPANY

221-25 W. Huron St., Chicago, Ill.
Telephone Superior 6022
AMERICAN HOIST Crawl-
ers, Cranes, Derricks, Truss
Lines, Bulldozers, Snow
Plows
BATES Wire Ties, etc.
BEEBE BROS. Hoists
CHAIN BELT Mixers,
Pavers, Pumps, Saw Rigs,
Conveyors, Elevators
Pumpcrete, Moto Mixers
Winlaw Whlt. Scales
McKernan-Terry Corp. (Divisions)
LAMBERT-NATIONAL—Hoists, Cableways
STEEL & CONDUCT—Special Machinery
Wheelbarrows, Hose, Cable Rope, Tarpsaulins,
etc., carried in stock

O. T. CHRISTERSON CO.

3900 So. Wabash Ave. Chicago, Ill.
Representing
BLAW-KNOX—Road Forms, Bins, Batches, Finishing
Machinery, Derricks, Truss
M. & E.—Road Pumps, Saw Rigs, 2-Ton Rollers
CHICAGO PNEUMATIC TOOL CO.—Compressors, Air
Tools, Hose
CLEVELAND—Subgraders, Straight Edges, Finishing
Tools
GORMAN-RUPP—Self Priming Centrifugal Pumps, Road
Carts, Derricks
KOEHRING—Mixers, Pavers, Cranes, Shovels, Dumpsters,
Mod Jacks, Trail Dumpers, Wheelers
KWIK-MIX—Concrete and Bituminous Mixers
PARSONS—Trunch Machines, Backfillers, Turbo Mixers
R-B—Power Subgraders, Trailgraders

Member: Associated Equipment Distributors

PEORIA TRACTOR & EQUIPMENT CO.

400 Franklin Street Peoria, Illinois

Representing
Athey Truss Wheel Co.
Caterpillar Tractor Co.
Killefer Mfg. Corp.
LaPlant-Choate Mfg. Co.
R. G. LeTourneau, Inc.
Willamette Hyster Co.
Universal Crusher Company
Telephone 6177

INDIANA EQUIP. CO., INC.

327-329 West Market St., Indianapolis, Ind.
Representing
ATHEY TRUSS—Wagon, Bulldozers
BUFFALO-SPRINGFIELD Rollers
"CATERPILLAR"—Road Machinery
"CATERPILLAR"—Trac-
tors
CHAIN BELT CO.—Mixers, Pulverizers
GARDNER-DENVER Compressors, Tools
LPLANT-CHOATE—Wag-
ons, Scrapers, Bulldozers
LE TOURNEAU—Scrapers, Buggies, Bulldozers
OWEN—Clamshell Buckets
PAGE—Dragline Buckets
SAUERMAN—Cableways, Power Scrapers
UNIVERSAL—Crushers, Pulverizers
THEW—Shovels, Draglines
TYLER-NIAGARA—Vi-
brating Screens

GIERKE-ROBINSON CO.

4th & Ripley St. Davenport, Iowa
Representing
BLAW-KNOX—Steel Road, Curb and Gutter Forms,
Bins, Batches, Clamshell Buckets, Truck Turntables,
Ord Concrete Road Finishers
CHAIN BELT—Mixers, Pavers, Pumps, Saw Rigs, Con-
veyors, Elevators
CLYDE—Gasoline and Steam Hoists, Derricks
MASTER—Vibrators, Generators, Arc Welders
SULLIVAN—Air Compressors, Tools
TRACKSON—Cranes, Shovels and Bulldozers
THEW-LORAIN—Cranes, Shovels, Draglines
TIMKEN—Detachable Rock Bits, Steels
UNIVERSAL—Truck Cranes
UNIVERSAL—Form Clamps

FLETCHER EQUIP. CO., INC.

390 Magazine Street New Orleans, La.
American Mfg. Co.
Bethlehem Steel Co.
Bates Valve Bag Corp.
Clyde Iron Works, Inc.
Diamond Iron Works
Gardner-Davies Co.
The Gorman-Rupp Co.
Insley Mfg. Co.
The Jaggor Machine Co.
Jones Superior Machine Co.
C. S. Johnson Co.
Koehring Co.
Kwik-Mix Mixer Co.
Littlerford Bros.
M & M Wire Clamp Co.
Mail Tool Co.
Owen Bucket Co.
Parsons Co.
Page Engineering Co.
Jas. E. Peillard Co.
Sagor Derrick Co.
Sauerman Bros., Inc.
Sterling Wheelbarrow Co.
Templeton, Keely & Co., Inc.
Universal Form Clamp Co.
Wood Shovel & Tool Co.

Member: Associated Equipment Distributors

Contractors and Engineers Monthly



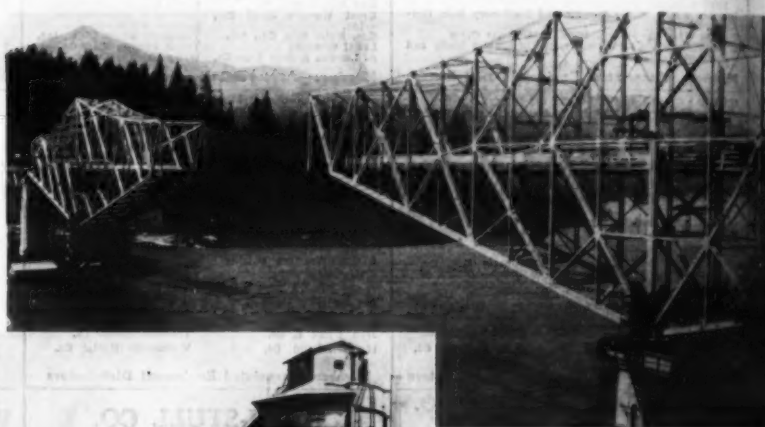
Airports are an important factor in our national defense program. Here are four new General clamshells cleaning up surplus material to be hauled away from the new Baltimore airport now under construction just outside Baltimore, Md.



C. & E. M. Photo
With the Martin County, Minn., Fair only 10 days away, the most important road in the county was the 1/2-mile dirt track at the Fair Grounds, so the County's Oshkosh truck and Adams No. 3 leaning-wheel grader put the track into shape. See page 14.



The Bridge of the Gods over the Columbia River above Bonneville Dam has been raised 44 feet to permit larger ships to navigate above the Dam. To accomplish this, the 383-foot center suspension span was removed and the two shore sections jacked up the necessary amount. At the right is the bridge with the suspension span removed and the end sections ready to be raised. See page 1.



C. & E. M. Photos



One of the phases of the Santee-Cooper power and navigation project in North Carolina is the construction of the lock and power house at Pinopolis Dam. At the left is the scene of the concrete-mixing operations, showing the conveyor-fed Blaw-Knox mixing plant. Central Engineering Co. of Davenport, Iowa, has the \$4,172,380 contract for the construction of the lock, power house and earth-fill dam. See page 2.



Flights are the rule this season, though necessarily for road construction they apparently were laid on when this pavement was laid on Alameda Road in Singapore. low is the same old dad sheet asphalt pavement fourteen years later.



Scenes on the Western Contracting Co. grading job at the west entrance to Dubuque, Iowa. Top, the staggering grader; center, one of the mobile floodlight outfits; and left, lubricant storage. See page 2.

The greater part of the county road construction and improvement in Jackson County, Mich., in the past three years has been with oil aggregate laid by the read-mix method. At the right is an Adams No. 3 Metroad Paver engaged in this type of road work. See page 1.



C. & E. M. Photo

